PUBLIC HEALTH REPORTS

In this issue

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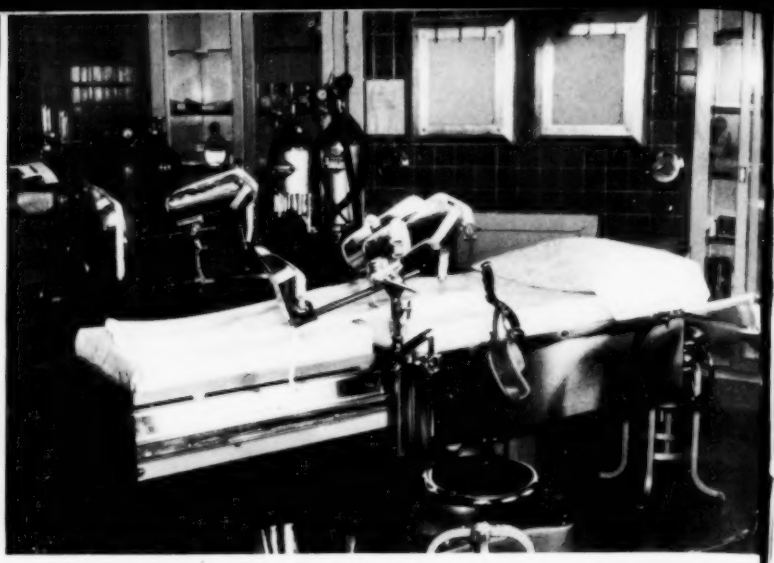

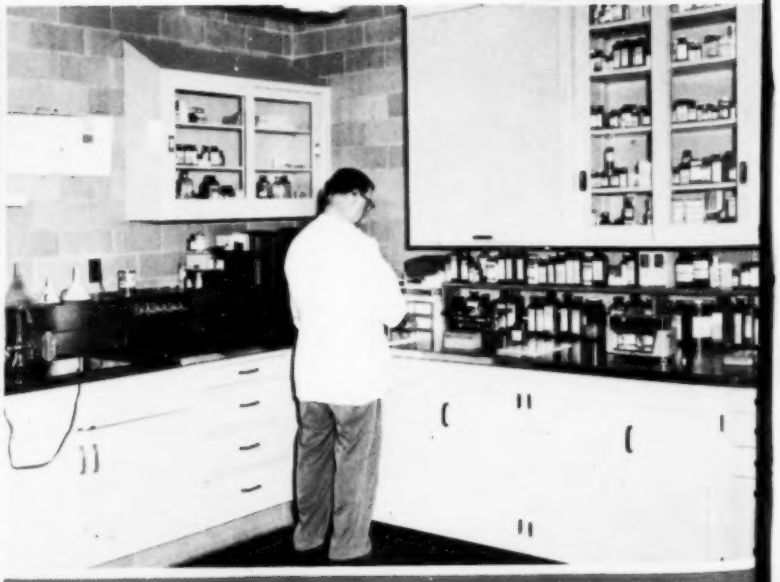

Growth and Development of a Base Hospital

The Charleston Memorial Hospital

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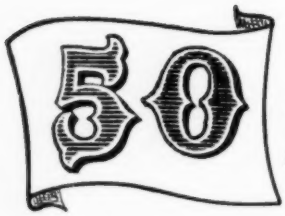

years ago in Public Health Reports

THE August 15, 1902, issue of *Public Health Reports* called attention to a "new and strange disease," prevailing in the Bitter Root Valley of Montana—"the so-called 'spotted fever' of the Rocky Mountains." Investigations of this disease by the United States Public Health and Marine-Hospital Service, which were to continue for many years, had begun.

Surgeon J. O. Cobb, of the Service, had been directed by telegram on June 23 to proceed to Missoula, Mont., in order to investigate an outbreak of spotted fever in that district. "The disease was said to be highly communicable and, therefore, a matter of importance to the public health of the country."

Dr. Cobb, who found that Dr. Louis B. Wilson and Dr. William M. Chowning of the Montana State Board of Health had already worked out many of the details concerning the cause of the disease and its method of transmission, reported, in part, as follows:

"For a definite number of years (17) the disease has been known among the local practitioners. . . ." It "has always been limited to the spring months, no case being reported later than July 20, and none earlier than 1 case on uncertain date in January. . . . All clinical experience goes to show that the disease is not contagious or infectious. It is, therefore, without doubt, an inoculable disease, as an intracorpuscular parasite has been found constantly present in the blood of each examined case this year. The organism resembles very closely Theobald Smith's Texas cattle fever organism, and it is certainly reasonable to believe . . . that this disease is introduced in man . . . in like manner as in the Texas cattle fever organism, viz, by the tick.

"Now, having found an intracorpuscular organism in the blood of their cases, the next step was to find the host, and here they were astonished to learn that it was a common belief among the people of the valley that the disease . . . was caused by the bite of the tick. Clinically, they found this idea correct, inasmuch as, positively, every patient gave history or showed evidence of being bitten by the tick. . . .

"As hundreds of persons are bitten with ticks throughout this portion of the State, and as a great many are bitten by ticks from this infected locality and comparatively few contract the disease, it was fair to presume that all ticks did not harbor the parasite. This naturally led to the presumption that the host was not the tick, but some animal infested by ticks. If the infected animal were the horse, cow, deer, sheep, or other ranging animal, then one would expect to find the disease gradually spread over a wider area from year to year.

". . . they found that the gopher (which in this section is the ground squirrel) was infested with ticks, and it is well known that this animal will not cross water except under extraordinary circumstances. This being true, it would give the necessary explanation why the disease was confined to such a small locality and why its limitation seemed to be so clearly defined. The next step was to obtain a great number of these animals for examination. This part of their work is uncompleted, but they have found enough to make them believe that the gopher of this particular section has . . . become infected with this organism and that it has acquired or inherited immunity.

"A further interesting observation is that the first cases follow closely the appearance of the spring crop of ticks and the disease subsides promptly upon the disappearance of the tick, which is usually about the first of July. This is a very strong point, for laying aside the difference in the clinical features of the diseases which have nothing in common with malaria, it seems nearly positive proof that the mosquito can be eliminated as a factor."

frontispiece

Pictured on the inside front cover is the Charleston Memorial Hospital, under development as a district hospital for the Charleston, W. Va., hospital service area. Its master plan calls for 440 beds, 132 begun in 1949 and 100 now under construction. The present facilities—including clinical and service activities and an out-patient department—have been in operation since October 1951. In keeping with the hospital service area concept, this institution will provide for more complete and advanced diagnostic and treatment facilities than are normally possible in smaller hospitals. The Memorial Hospital also houses a branch of the Charleston-Kanawha County Health Department.

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The Health Department and Nursing Homes

By MARGARET RANCK, R.N., and R. R. CUNNINGHAM, B.S.

The number of nursing homes in the United States has increased with the number of older people in the population. Because of many factors in family life and in our culture, these homes have come to provide care for the aged, the chronically ill, and the convalescent patient. Since the problems involved in the care of these older people probably differ little from State to State, the experience of Illinois in dealing with them may be of general interest.

In Illinois, popular concern about nursing homes and their growth became so great by 1945 that an organized drive developed for a licensing program. Through legislation enacted that year, the Illinois Department of Public Health became responsible for the licensing and supervision of nursing homes. The objective in licensing is to assure good personal care in a pleasant, safe environment where individual dignity is respected and recognized.

Under this law, any establishment housing three or more persons who "by reason of illness or physical infirmity are unable properly to care for themselves," must be licensed on the basis of minimum standards of sanitation, hygiene, diet, and number and type of personnel. The State Department of Public Health is responsible for establishing minimum standards for licensure.

Proprietary and nonprofit homes, including those for the aged that provide infirmary care, are licensed under the Nursing-Home Act. Nursing units of a general hospital which are principally for the care of the chronically ill, nursing homes operated by Federal and State governmental units, and private mental institutions and rest homes (licensed by the State Department of Welfare under provisions of the Illinois Mental Health Act) are specifically excluded. Homes in municipalities having local provisions for licensing comparable to those of the State law are also excluded. At present, these include the cities of Chicago, Evanston, East St. Louis, Rockford, and Springfield.

Miss Ranck is consultant nurse and Mr. Cunningham is sanitary engineer with the bureau of hospitals of the Illinois Department of Public Health.

Administration of the Program

Since many of the requirements of the Nursing-Home Act involve sanitation and building, its administration was first delegated to the State health department's division of sanitary engineering. After 4 years' experience in administering the act, program emphasis had changed to considering the service to residents in the building as of prime importance. The job of administration was transferred to the bureau of hospitals of the division of hospitals and chronic illness in July 1949.

The bureau staff assigned directly to the administration of the licensure program includes a sanitary engineer, two registered nurses, two stenographers, and a clerk. The services of other specialized personnel are available for consultation. Although the statute places the responsibility for the administration of the program on a State level, it has been the policy of the small, central staff to serve in a consultant capacity. Much of its direct counseling service is provided through a cooperative arrangement with regional, county, and city

health departments. Thus, the staff's counseling service is available to the entire State, and the organized local health departments are strengthened.

These local health departments, familiar with conditions in their communities, evaluate proposed homes, interview prospective operators, make visits, and investigate complaints. Their reports and recommendations, made verbally to the home management, are submitted to the bureau of hospitals for forwarding to nursing homes concerned. It is the policy of the bureau to uphold local health department recommendations.

When the manager of a home inquires about licensing, he is asked to submit a preliminary application blank containing information concerned with administrative ability. References are queried. If replies are satisfactory, the local health department is asked to inquire further into executive aptitude, survey the building, and give advice and make recommendations regarding staff, program, building, and equipment.

The home management is always entitled to a hearing under the law. Management frequently requests an opportunity to discuss new construction and remodeling, assistance with organizational structure, nursing care, and many other problems. Legally the department does not revoke or refuse a license without fair hearing before the director of the department. This procedure has rarely been necessary because educational measures are used to help the homes meet the standards.

The Nursing-Home Act provides that the homes must be inspected and approved by the office of the State Fire Marshal as well as supervised by the State Department of Public Health. No nursing home is licensed in Illinois without written approval from the division of fire prevention of the Department of Public Safety, certifying that the home is satisfactorily protected against fire hazards.

Many Illinois cities and counties have either passed or are considering zoning ordinances which would regulate the types of buildings, their uses, and locations within corporate limits. So that there will be no violation of local zoning ordinances, a license is not issued to a nursing home until a permit to use the location is received from local governmental authorities.

Health Team Responsibilities

The activities of the various professions on the health team concerned with nursing home visitation and counseling are basically complementary. Major responsibilities are fairly well defined.

Public Health Nurse

The public health nurse is concerned primarily with the adequacy and competency of the nursing home staff. She observes the ability of the operator to conduct an efficient business, notes the physical and apparent emotional health of the staff, and inquires as to their living and working arrangements. She also notes the medical attention given residents, and observes whether or not physicians' orders are written, whether adequate medical and nursing records are being utilized, whether there is proper storage and accounting of drugs and prescriptions, and whether proper policies are being employed in admitting and discharging residents. She is concerned also with comfortable furnishings and nursing care equipment.

In addition, the nurse evaluates nursing procedures and treatment techniques. She checks the personal hygiene of the residents. She is concerned with policies about the use of the telephone, visiting hours, and mail censorship. She notes whether a resident of a multipatient room has privacy for treatment or during acute illness and whether this privacy extends to interviews with his clergyman, social case worker, and family. She calls attention to new and useful reference materials.

Many other items concern her. The resident's personal property must be properly stored; housekeeping, personal care, and laundry service must assure control of odors; food must be nutritionally adequate, attractive in appearance, and satisfactorily served. There must be some device for signaling an attendant.

The nurse encourages the use of the living room since recreational and occupational therapy are so valuable. Here members may join in activities designed to divert attention from themselves. She encourages residents to

move freely about the home and thus calls attention to the importance of ramps and handrails on porches, stairs, and long hallways, as well as adequate storage space for walkers, crutches, and wheel chairs.

Her job is more difficult because of the need for many more nurses in Illinois homes. A survey made of 317 licensed homes in January 1950 indicates that only a very small percentage of the residents in these homes were receiving the services of a graduate professional nurse (see table).

The Technical Subcommittee on Chronic Hospitals and Nursing Homes of the Committee for the Improvement of Nursing Service of the Illinois State Nurses' Association has established a standard of 2½ hours of nursing care for each patient per day (24 hours); one-sixth of this service is to be provided by professional nurses and five-sixths by nonprofessional or practical nurses. On the basis of the 1950 study, 827 professional and 4,135 practical nurses would be required to meet the standards of the committee. Significantly, only 344 professional and 1,924 practical nurses were employed in Illinois nursing homes at that time. The situation is somewhat improved since that study was made.

Sanitary Engineer

The sanitary engineer is concerned with the layout and facilities of the nursing home's physical plant and with all safety and sanitary measures that tend to promote health. In homes not served by a public water supply and sewerage system, for instance, he advises the operator on the construction, maintenance, and operation of private facilities. Since most Illinois nursing homes are located within the corporate limits of a municipality, the water supply and sewage disposal facilities seldom create serious problems.

The sanitary engineer surveys all plumbing fixtures in the building from the standpoint of back siphonage and cross connections because of the danger of water contamination. He sees that the building is provided with a sufficient quantity of hot running water, that it is equipped with a central heating plant with at least one outlet in each room, that it has facilities for the proper storage and disposal of garbage and for washing bedpans and other utensils, and that it has the proper number of bathrooms and fixtures. He pays special attention to such safety precautions as width, rise, and tread of stairways, handrails, condition of floors, unnecessary obstructions, and the location of lighting fixtures.

Since the majority of nursing homes operating in Illinois were previously large private dwellings, the engineer often must recommend changes. The size and arrangement of kitchen equipment to allow for sanitary food preparation, storage, and distribution often present problems. Original floor plans commonly permit traffic through patients' rooms, or through the kitchen to bathrooms or laundry. Often the bathrooms or bedrooms open directly into food preparation areas. These also require changes.

The minimum standards for licensure specify that the capacity of the home is dependent upon the number of square feet available in each bedroom area. The engineer, therefore, measures the rooms and prepares sketches which assist the operator to determine room capacity and to make certain that sufficient space is allowed for storage. Such sketches may also indicate the installation of additional windows for lighting and ventilation.

The location of the building has an important

Administrator of nursing service in 317 licensed nursing homes Jan. 1, 1950

Professional training of administrator	Proprietary homes		Nonprofit homes (endowed, religious, fraternal)	
	Number homes	Number residents	Number homes	Number residents
Registered nurse	55	1, 641	18	2, 046
Nurse graduated from 3-year course	37	791	6	373
Nonprofessional nurse with experience only	183	2, 973	18	1, 077

bearing upon services provided by the sanitary engineers. It should be on a serviceable street with special consideration given to the proximity of industrial plants, highways, railroads, and business establishments. It must be equipped with a telephone to summon physicians, relatives, the fire department, or other services. An adequate, well-drained yard space should be provided so residents can be out-of-doors as much as possible.

Nutritionist, Dietitian, Architect

The nutritionist visits nursing homes according to their recognized needs and desire for help. She gives guidance concerning kitchen planning and arrangement, menu planning, food buying, storage, service, and recipes. She acts as a resource person at group operators' meetings and at health department staff meetings.

The bureau of hospitals urges people who plan to establish, remodel, or enlarge nursing homes to send in their original blueprints for approval prior to actual construction. If these involve facilities for food service, the consultant dietitian gives recommendations on layout and efficient operation, necessary equipment, and the location of food storage facilities.

Since nursing homes in Illinois usually operate on limited funds, plans for alterations or additions are ordinarily drawn up in rough form by a local builder or contractor. While the bureau of hospitals' architect is not permitted to prepare detailed professional drawings and specifications, he does assist in review of the plans.

Occasionally, too, the architect visits the home and discusses with the operator the cost and feasibility of proposed alterations. As a service to operators, contractors, and practicing architects, he has developed a plan for a typical two-bed and four-bed unit, showing the utility room, nurses' station, and bathroom for each sex, in accordance with the needs of infirm residents and the minimum standards for licensure.

Educational Program

Since the owners of most nursing homes have entered a new business with little experience, the importance of educational programs which develop a greater appreciation of good personal care cannot be overemphasized. As has been pointed out, the bureau of hospitals has distributed educational materials to the homes, some prepared by the State Department of Public Health and others by other health and welfare agencies. These cover such subjects as "Aging," "Menu Suggestions for Nursing Homes," "Food Handling Regulations," "Food Needs as We Grow Older," and "Eating Is Fun for Older People, Too."

In addition, the bureau has cooperated with the Department of Nursing of Loyola University, Chicago, in presenting a series of institutes on nursing care of the older patient. This joint project has proved an excellent means of interesting both students and professional nurses in the field of geriatric nursing. Schools of nursing, too, are beginning to use nursing homes as experience fields for professional and practical nursing students. The bureau encourages the development of such training if it is properly supervised. This experience is valuable not only to the student, but also to the self-respect of the home.

Since the inception of the nursing home program, routine visits and printed literature have not been considered complete answers to the educational needs of nursing home operators. From this feeling grew a series of group meetings. The first, which took place early in 1949, was organized for a discussion of the medical and nursing record forms which the department provides for all nursing homes. Among the topics discussed subsequently were food service problems, various phases of nursing, activity programs, and fire protection.

State-Wide Organization

Interest in a state-wide organization of nursing home operators began to develop as a result of these small meetings, and the Illinois Association of Nursing Homes came into being in March 1950. Its purpose, according to its constitution, is "to promote good standards of care in nursing homes by adherence to a code of ethics among its members . . . and by the development and dissemination of information which will lead to better care of patients and

the solution of problems which are common to the individual members of the Association."

Constituent district nursing home associations, in order to be recognized by the Illinois Association, must include in their constitutions or bylaws the equivalent of the following code of ethics as one of the qualifications for membership:

Management with integrity and responsibility.
Service with regard to the total physical, mental, and spiritual needs.
Staff of good moral character, experience, competency.
Facilities with provision for safety and adequate care.
Courtesy to residents, relatives, and the public.
Cooperation with the community, health, and welfare agencies and with professional personnel.

Of 560 licensed nursing homes in the State on March 15, 1952, 104 are now members of the Illinois Association of Nursing Homes. The membership is small, but it is active and enthusiastic. During its first year of operation it was admitted into the American Association of Nursing Homes, which accepts only associations in States which license homes by statute. Through its education committee the Illinois Association has sponsored three institutes on nursing home management in cooperation with the University of Illinois and the Illinois Department of Public Health. The fourth is scheduled for November 11–14, 1952.

In 1950 the Illinois Association of Nursing Homes cooperated with the Illinois State Nurses' Association and other allied health organizations in promoting legislation to include practical nursing licensure as a part of the Illinois Nurse Practice Act. The nursing home association supported amendments to the Nursing-Home Act. Both these bills were enacted into law in 1952.

In addition to the tangible benefits the homes derive from the organization, there is a growing feeling of solidarity in the association in facing problems common to the whole group, improving public understanding of the nursing home as an essential community service, and developing higher standards than are required by the State for nursing home licensure.

People and their needs must be the focus of attention. Many residents are in these homes for reasons other than chronic illness. Many have passed their eighty-fifth birthday, but at least half of them are able to walk without support. They need companionship and friendship as well as housing, nursing, and maid service. They may require some supervision and direction. They need outlets to develop skills which give satisfaction.

Health department personnel, then, must be more than inspectors. They must be good teachers. They must assist the owners and superintendents of homes in reaching a higher level of operation than the lowest standard the State will accept for licensure. To do this in Illinois, counseling and visitation must be increased and more institutes conducted by the Illinois Association of Nursing Homes in cooperation with the colleges and universities.

Moreover, a great deal might be accomplished by adding a group worker, trained and experienced in social work techniques, to the existing consultant staff to assist management to develop programs in the homes designed to retard mental and emotional deterioration of the individual. Practical nursing education should be promoted in accordance with the recommendations of the National Association for Practical Nurse Education and in accordance with the practical nurse aspects of the Illinois Nursing Act. Continued assistance should be given to the Illinois Association of Nursing Homes in developing and improving records, simple accounting forms, nursing procedures, and general policies for use by the homes. Assistance is being given in the development of a nursing home administration manual.

The bureau of hospitals should continue to work with superintendents of homes for the aged and representatives of medical, nursing, and dental groups in developing a cumulative health record for the apparently well resident. It should also assist them in developing plans for regular preventive service. It is hoped that a state-wide association of homes for the aged will be organized and that it will give guidance to the Illinois Department of Public Health in the development of educational materials for the operation of such nonprofit homes.

Conclusions

In Illinois, as throughout the Nation, the general public is not always aware of the costs

of operating satisfactory homes. Nonprofit homes, praiseworthy as they are, have difficulty acquiring funds for improvements, expansion, or the building of new plants. Commercial nursing homes have no subsidy. For improvements and expansion they have only the profits made from caring for residents after expenses have been deducted. Obviously, minimum standards will have to remain low until these homes are remunerated so they can provide better care. Social case-work services, physiotherapy and occupational therapy, and more recreation and diversion services are badly needed in many homes.

With mounting costs of equipment, labor, food, utilities, and taxes, the commercial nursing homes may be forced to discontinue service to those persons dependent on public funds for their care. Illinois is comparatively generous in paying for this care, yet there is great pressure on the licensing agency to abolish living rooms in the homes and to permit crowding of residents so that the commercial home may operate without a deficit. Standards for additional services could be written now, but it is doubtful if they could be enforced until much more education, for boards of directors, owners, and staff, has promoted a readiness to proceed another step upward.

A study of nursing home laws and regulations in various States reveals a startling need for some type of standardization. A nation-wide committee has been appointed to draft a statement of standards. The availability of a national manual of desirable as well as minimum standards is to be hoped for.

The 1951 revision of the Illinois Nursing-Home Act provided for a Nursing Home Advisory Council composed of two representatives of the Association of Nursing Homes and one representative each of the Hospital Association, Medical Society, State Nurses' Association, State Fire Marshal, Public Aid Commission, Municipal League, and the County and Township Officials' Association. The advisory council has already given helpful service to the bureau of hospitals in the development of revised standards.

A broadly representative national committee is needed. It should be adequately financed so as to have secretarial service and a travel budget for attendance at committee meetings. It should be representative of all sections of the country and of such organizations as the American Public Health Association, National League for Nursing, State and Territorial Health Officers' Association, National Social Welfare Assembly, Council of State Governments, American Municipal Association, National Fire Protection Association, Commission on Chronic Illness, American Public Welfare Association, American Association of Nursing Homes, American Hospital Association, and of other nursing home associations, homes for the aged, community chests, and councils.

Its functions might include development of suggested laws, ordinances, and desirable and minimum standards that would be useful to States, cities, and counties.

The next step in improving conditions in the homes might be the enactment of valid city or county licensing ordinances, administered by full-time local health departments.

Experience in administering the nursing home program in Illinois has indicated the rapidity of the development of this type of service. It has pointed to the need for licensing control in order to assure minimum standards of care and has demonstrated the value of education for better standards of care.

Licensing agencies, local health and welfare departments, and many national organizations, as well as the general public, are beginning to realize the importance of the nursing home as a valuable community facility. With this support, such institutions can provide an increasingly valuable service in the care of the aged, physically infirm, and convalescent citizen.

Morbidity and Mortality Experience Among Chromate Workers

By HUGH P. BRINTON, Ph.D., ELIZABETH S. FRASIER, Litt.B., and A. LINK KOVEN, M.D.

The abnormally high rate for cancer of the respiratory system among workers in the chromate-producing industry was demonstrated by Machle and Gregorius (*1*) in 1948. At that time, so far as was known, nothing on morbidity experience and little on other causes of death among chromate workers had been published. The present report on morbidity and mortality among male workers in the seven chromate-producing plants in the United States is offered because of the increasing interest in problems related to specific health hazards in this industry.

In 1950–51 the Public Health Service made an engineering study of the working environment in all seven plants and a detailed medical study of workers in six of the plants. As part of these studies, data were collected on paid death claims and on claims for sickness and nonindustrial injuries disabling for eight calendar days or longer among members of sick-benefit plans. This morbidity and mortality report thus covers all workers who are members of sick-benefit plans in the seven plants in the United States engaged in the extraction of chromates from chemical-grade chromite ore. These plants are located in Maryland, New Jersey, New York, and Ohio. Periods for which accurate sickness and death records were available varied from 2 to 11 years. The rules and regulations of the sick-benefit plans may be summarized as follows:

In all of the plants, benefits began on the eighth day of disability. Prior to 1949 the maximum period for which benefits were paid was 13 weeks. With the passage of a sickness insurance law in New Jersey, effective on January 1, 1949, plants located in that State had maximum benefits extended to 26 weeks. However, in order that the data for all companies be comparable, cases of disability lasting longer than 98 days were arbitrarily closed at 98 days. The calendar days of disability, therefore, are defined as the number of calendar days from the date of onset of disability to the date of return to work or to the ninety-eighth day, inclusive, except when the employee died or was pensioned before the ninety-eighth day.

Before 1949 the probationary or waiting period between employment and eligibility for membership in the sickness insurance plan was 6 months for two plants, 3 months for one plant, and 1 month for three plants; one plant had no plan. After the New Jersey State sickness insurance law went into effect in January 1949 and a New York law became effective on July 1, 1950, workers in the plants in these areas were eligible for benefits as soon as they were employed. By the end of 1950, one plant still had a waiting period of 6 months, one plant had a waiting period of 1 month, and the remaining five plants, located in New York and New Jersey, had no probationary periods.

At first, membership in the sickness insurance plans was voluntary in all plants, but after the enactment of the New Jersey and New York laws, membership was compulsory for plant workers in those States. In the two plants where membership remained voluntary,

Dr. Brinton and Miss Frasier are with the statistical section of the Division of Occupational Health, Public Health Service; Dr. Koven is with the medical section of that division.

The data presented in this paper were collected in connection with the division's study of health among workers in the chromate-producing industry. A comprehensive report on the health of these workers will be published separately.

coverage was approaching 100 percent of all employees toward the end of the study period.

Although a medical examination was not required before a worker could become a member of a sickness insurance plan, all plants required a medical examination before employment. There were no age limits on eligibility for membership. However, some plants which allowed 26 weeks' benefits for each different disease during a year permitted only a total of 26 weeks per year for all diseases for persons over 60 years of age.

From the foregoing rules and regulations it is evident that the only newly employed workers included in the study were those who entered the New Jersey plants during 1949 and 1950 and the New York plant during the last 6 months of 1950. Neither the morbidity nor the mortality experience of employees during the probationary period (whether they quit or remained with the plant) was included.

The disability analysis is based on only those cases that occurred while a worker was a member of the sickness insurance plan. All disabilities that ended between January 1, 1946, and December 31, 1950, are included, provided that they lasted for 8 calendar days or longer. Hence, disabilities that began in 1945 and ended in 1946 are included. The actual number of days for all cases ending during the study period are counted up to the ninety-eighth day, inclusive. Industrial injuries and compensated cases of occupational disease are not included.

The mortality analysis is based on information from the records of the sick-benefit associations which contained data on death benefits. Only deaths of workers who were members of a sick-benefit association and died within one year after becoming disabled are included. Sudden deaths and deaths before the eighth day of disability are included; although these cases were not eligible for sickness benefits, they were eligible for death benefits. Deaths due to industrial injuries are not included. All deaths were classified by cause as given on the death certificate without additional verification.

Disability Experience, 1946–50

During the 5-year period 1946–50, for the seven chromate plants there was a total of 5,121 person-years of membership in sick-benefit plans, 3,663 for whites and 1,458 for nonwhites. It will be observed from table 1 that the proportion of nonwhites in the total membership declines rapidly after 55 years of age. In the age group 65 years and over there were 136 white males as compared with 9 nonwhite.

Table 1. Person-years of membership in sick-benefit plans, by age and race

Race	Total	Age, in years				
		15–34	35–44	45–54	55–64	65 and over
All males	5, 121	1, 497	1, 457	1, 212	810	145
White	3, 663	1, 014	1, 015	803	695	136
Nonwhite	1, 458	483	442	409	115	9

Six of the plants reported during the full 5-year period, with a steady increase in the average membership in sick-benefit plans from 1946 through 1949. The seventh, a small plant, reported only during the last 2 years, 1949 and 1950.

Frequency by Year Case Ended

In 1946, the average annual number of cases of disability on account of sickness and nonindustrial injuries was 130.9 per 1,000 white and 186.2 per 1,000 nonwhite males, compared with 109.8 and 124.6, respectively, in 1950 (table 2). The rates for the broad cause groups are not shown in this table, but an examination of those rates reveals that the abnormally low rate for white males in the chromate industry in 1947 (86.0) is attributable to a marked decrease in respiratory diseases for that year. Nonwhite males also showed a decrease in the respiratory disease rate for 1947, but this was more than counterbalanced by an increase in nonrespiratory-nondigestive diseases. There was a slight upward trend in the rates for nonindustrial injuries, while the rates for digestive diseases and nonrespiratory-nondigestive diseases fluctuated, but not in one particular direction.

Duration According to Broad Cause Group

Disability frequency rates for white and nonwhite males under 55 years of age according to duration of case are presented in table 3 for the broad cause groups. For sickness and non-

Table 2. Frequency of sickness and nonindustrial injuries lasting 8 consecutive days or longer, according to year case ended, by race [1]

Year case ended	Annual number of cases per 1,000 males			Number of cases			Average person-years of membership in sick-benefit plan		
	Total	White	Nonwhite	Total	White	Nonwhite	Total	White	Nonwhite
1946–50	128.3	116.3	158.4	657	426	231	5,121	3,663	1,458
1946	147.3	130.9	186.2	123	77	46	835	588	247
1947	120.7	86.0	200.0	115	57	58	953	663	290
1948	145.6	137.8	164.5	151	101	50	1,037	733	304
1949	119.6	117.6	125.0	141	101	40	1,179	859	320
1950	113.7	109.8	124.6	127	90	37	1,117	820	297

[1] Industrial injuries and venereal diseases are not included. The data include experience of 6 plants during 1946–50, and the seventh plant during 1949–50 only.

industrial injuries the rate for nonwhites for each duration is more than one and one-half times the rate for whites for the corresponding duration. The excess in the rate for nonwhites over the rate for whites is greatest for the respiratory diseases, next for the digestive diseases, and lowest for the nonrespiratory-nondigestive diseases. These differences cannot be

Table 3. Frequency of sickness and nonindustrial injuries among males under 55 years of age, according to duration, by race and cause [1]

Duration of case in calendar days	Annual number of cases per 1,000 males					
	White	Nonwhite	White	Nonwhite	White	Nonwhite
	Sickness and nonindustrial injuries		Nonindustrial injuries		Total sickness	
8 days or longer	86.2	156.7	8.1	17.3	78.1	139.4
15 days or longer	68.5	121.4	5.6	15.0	62.9	106.4
22 days or longer	45.2	86.2	3.2	8.2	42.0	78.0
29 days or longer	34.3	60.7	2.5	5.2	31.8	55.5
43 days or longer	23.3	35.2	1.8	2.2	21.5	33.0
57 days or longer	15.9	29.2	1.1	1.5	14.8	27.7
92 days or longer	10.2	15.7	.3	0	9.9	15.7
	Respiratory diseases		Digestive diseases		Nonrespiratory-nondigestive diseases [2]	
8 days or longer	34.3	79.5	15.9	26.2	27.9	33.7
15 days or longer	25.4	63.0	13.8	20.2	23.7	23.2
22 days or longer	10.9	45.0	11.3	16.5	19.8	16.5
29 days or longer	7.1	26.2	8.5	16.5	16.2	12.8
43 days or longer	4.6	12.8	5.3	11.2	11.6	9.0
57 days or longer	3.9	10.5	2.8	9.0	8.1	8.2
92 days or longer	2.8	6.8	1.4	2.2	5.7	6.7
Average number of person-years of membership	2,832	1,334	2,832	1,334	2,832	1,334

[1] Industrial injuries and venereal diseases are not included. Data include experience of 6 plants during 1946–50, and the seventh plant during 1949–50 only. [2] Ill-defined and unknown causes are included.

attributed to difference in age since the two races have approximately the same age distribution.

Sickness According to Detailed Cause

The annual number of cases per 1,000 males, the annual number of days disabled per male, and the average number of days per disability case are shown for both white and nonwhite males under 55 years of age in table 4. Specific causes which have a frequency rate for nonwhite males more than twice that for white males include nonindustrial injuries, tuberculosis of respiratory system, influenza and grippe, pneumonia, other respiratory diseases, diarrhea and enteritis, hernia, other digestive diseases, cancer, and diseases of organs of movement except diseases of joints. Diseases which occurred more frequently among the whites than among the nonwhites include diseases of stomach except cancer, appendicitis, neuralgia, neuritis, sciatica, other diseases of

Table 4. Frequency and number of days per male and per case for sickness and nonindustrial injuries lasting 8 consecutive days or longer among males under 55 years of age, according to detailed cause group, by race [1]

Cause	Annual number of cases per 1,000 males		Annual number of days per male [2]		Average number of days per case [2]	
	White	Nonwhite	White	Nonwhite	White	Nonwhite
Sickness and nonindustrial injuries	86. 2	156. 7	3. 05	5. 29	35. 4	33. 8
Nonindustrial injuries	8. 1	17. 3	0. 23	0. 48	28. 4	27. 7
Sickness	78. 1	139. 4	2. 82	4. 81	36. 1	34. 5
Respiratory diseases	34. 3	79. 5	. 93	2. 44	27. 0	30. 8
Tuberculosis of respiratory system	. 7	5. 3	. 07	. 51	98. 0	98. 0
Influenza, grippe	9. 5	25. 5	. 21	. 57	22. 2	22. 5
Bronchitis, acute and chronic	9. 5	12. 0	. 24	. 26	25. 3	21. 6
Pneumonia, all forms	5. 7	18. 7	. 22	. 56	38. 2	29. 7
Diseases of pharynx and tonsils	3. 6	6. 0	. 08	. 12	23. 0	20. 6
Other respiratory diseases	5. 3	12. 0	. 11	. 42	20. 0	34. 8
Digestive diseases	15. 9	26. 2	. 62	1. 10	38. 9	41. 8
Diseases of stomach except cancer	4. 2	3. 7	. 15	. 24	35. 3	63. 6
Diarrhea and enteritis	1. 8	3. 7	. 04	. 07	24. 6	18. 6
Appendicitis	4. 2	3. 7	. 13	. 13	31. 1	35. 6
Hernia	3. 2	9. 8	. 18	. 50	55. 9	51. 4
Other digestive diseases	2. 5	5. 3	. 12	. 16	46. 9	29. 6
Nonrespiratory-nondigestive diseases	27. 2	33. 7	1. 25	1. 27	46. 1	37. 7
Infectious and parasitic diseases [3]	1. 8	3. 0	. 06	. 05	36. 0	17. 5
Cancer, all sites	1. 8	6. 0	. 14	. 43	80. 6	71. 6
Rheumatism, acute and chronic	2. 8	4. 5	. 14	. 17	49. 9	39. 0
Neuralgia, neuritis, sciatica	1. 1	. 8	. 06	. 01	55. 7	14. 0
Other diseases of nervous system	2. 8	. 8	. 16	. 01	55. 6	11. 0
Diseases of heart	3. 2	2. 2	. 23	. 17	74. 2	74. 7
Other diseases of circulatory system	2. 8	1. 5	. 07	. 03	23. 6	22. 5
Diseases of genitourinary system	1. 8	2. 2	. 05	. 03	26. 0	13. 0
Diseases of skin	2. 5	2. 2	. 06	. 03	24. 6	13. 0
Diseases of organs of movement except diseases of joints	1. 0	4. 5	. 02	. 08	15. 7	17. 5
All other diseases	5. 6	6. 0	. 26	. 26	47. 1	42. 8
Ill-defined and unknown causes	. 7	0	. 02	0	26. 5	----------
Average number of person-years of membership	2, 832	1, 334	2, 832	1, 334	2, 832	1, 334

[1] Industrial injuries and venereal diseases are not included. Data include experience of 6 plants during 1946–50, and the seventh plant during 1949–50.

[2] The number of days of disability is the number of calendar days from the date disability began to the date of return to work, or to the 98th day, except in the event the employee died or was pensioned before the 98th day.

[3] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

Table 5. Frequency of sickness and nonindustrial injuries lasting 8 consecutive days or longer, according to age, by race and broad cause group [1]

Age group, by years	Annual number of cases per 1,000 males								
	Total	White	Nonwhite	Total	White	Nonwhite	Total	White	Nonwhite
	Sickness and nonindustrial injuries			Nonindustrial injuries			Total sickness		
All ages	128.3	116.3	158.4	10.6	8.5	15.8	117.7	107.8	142.6
Under 35	99.5	78.9	142.9	12.7	9.9	18.7	86.8	69.0	124.2
35–44	89.2	71.9	129.0	10.3	6.9	18.1	78.9	65.0	110.9
45–54	143.6	113.3	202.9	9.9	7.5	14.7	133.7	105.8	188.2
55 and over	213.6	219.0	177.4	8.4	9.6	0	205.2	209.4	177.4
	Respiratory diseases			Digestive diseases			Nonrespiratory-nondigestive diseases [2]		
All ages	52.5	41.5	80.2	20.9	18.8	26.1	44.3	47.5	36.3
Under 35	46.1	31.5	76.6	21.4	16.8	31.0	19.3	20.7	16.6
35–44	40.5	31.5	61.1	14.4	12.8	18.1	24.0	20.7	31.7
45–54	61.9	41.1	102.7	22.3	18.7	29.3	49.5	46.0	56.2
55 and over	69.1	66.2	88.7	28.3	28.9	24.2	107.8	114.3	64.5
	Average number of person-years of membership								
All ages	5,121	3,663	1,458	5,121	3,663	1,458	5,121	3,663	1,458
Under 35	1,497	1,014	483	1,497	1,014	483	1,497	1,014	483
35–44	1,457	1,015	442	1,457	1,015	442	1,457	1,015	442
45–54	1,212	803	409	1,212	803	409	1,212	803	409
55 and over [3]	955	831	124	955	831	124	955	831	124

[1] Industrial injuries and venereal diseases are not included. Data include experience of 6 plants during 1946–50, and the seventh plant during 1949–50.

[2] Ill-defined and unknown causes are included.

[3] Of the 831 white person-years of membership 136 or 16 percent were 65 years and over; of the 124 nonwhite person-years of membership 9 or 7 percent were 65 years and over.

nervous system, diseases of heart, other diseases of circulatory system, and diseases of skin.

With regard to race, the number of days of disability per male follows much the same pattern as the frequency rate.

Days per case averaged 35.4 for white males and 33.8 for nonwhite. With the exception of influenza and grippe, other respiratory diseases, diseases of the stomach except cancer, appendicitis, diseases of heart, and diseases of organs of movement except joints, the average days per case for the whites are equal to or greater than those for the nonwhites.

Age and Broad Cause Group

Table 5 shows the effect of age on the frequency of sickness and nonindustrial injuries. For both races the sickness rate tends to increase with advancing age. Among white males 55 years of age and over, the nonrespiratory-nondigestive disease rate is more than five times that for persons under 35 years. Among nonwhite males the older group has a frequency rate almost four times that of the younger group. Respiratory diseases are much more common among nonwhite males at each age group, but the relative excess was less among persons 55 years of age and over.

Comparative Sickness Experience

In table 6, the sickness experience during 1946–50 for white male chromate workers is compared with a large group of industrial workers (predominantly white). The annual number of cases of sickness per 1,000 males was 107.8 for chromate workers and 96.3 for other industrial workers.

In general, the rates for specific causes of

disability among chromate workers are not greatly different from those found for other industrial workers. However, it will be observed that illness from cancer appears excessive among chromate workers—7.1 compared with 0.7 for workers in other industries. Respiratory diseases are slightly more frequent among chromate workers, the major part of the excess being due to higher rates for influenza and grippe, bronchitis, acute and chronic, and pneumonia. When cancer is omitted the rate for nonrespiratory-nondigestive diseases is very similar for the two groups, except for a slightly higher heart disease rate among chromate workers.

Disability and Deaths From Cancer

Cancer disability and death data during the 11-year period 1940–50, inclusive, are based on the experience of members of two plants during 1940–50, one plant during 1943–50, three plants

Table 6. Frequency of sickness and nonindustrial injuries lasting 8 consecutive days or longer, among workers in chromate-producing plants and in various other industries, according to cause [1]

Cause	Annual number of cases per 1,000 males		Number of cases	
	Chromate	Various industries [2]	Chromate	Various industries [3]
Sickness and nonindustrial injuries	116.3	108.4	426	112,803
Nonindustrial injuries	8.5	12.1	31	12,566
Sickness	107.8	96.3	395	100,237
Respiratory diseases	41.5	34.0	152	35,406
Tuberculosis of respiratory system	*.8* [3]	.6	3	644
Influenza, grippe	13.1	11.9	48	12,389
Bronchitis, acute and chronic	11.7	5.5	43	5,731
Pneumonia, all forms	6.3	4.2	23	4,407
Diseases of pharynx and tonsils	3.6	3.7	13	3,865
Other respiratory diseases	6.0	8.1	22	8,370
Digestive diseases	18.8	17.6	69	18,356
Diseases of stomach except cancer	4.9	5.5	18	5,749
Diarrhea and enteritis	1.9	2.3	7	2,347
Appendicitis	3.8	3.6	14	3,774
Hernia	4.4	2.7	16	2,842
Other digestive diseases	3.8	3.5	14	3,644
Nonrespiratory-nondigestive diseases	46.7	41.6	171	43,287
Infectious and parasitic diseases [4]	1.4	2.6	5	2,726
Cancer, all sites	7.1	.7	26	750
Rheumatism, acute and chronic	4.1	4.0	15	4,186
Neuralgia, neuritis, sciatica	1.6	2.4	6	2,490
Other diseases of nervous system	3.5	3.7	13	3,851
Diseases of heart	7.9	4.6	29	4,739
Other diseases of circulatory system	6.0	6.3	22	6,591
Nephritis, acute and chronic	*.6* [3]	.4	2	405
Other diseases of genitourinary system	3.0	3.4	11	3,518
Diseases of skin	3.0	3.6	11	3,686
Diseases of organs of movement except diseases of joints	1.9	3.3	7	3,459
All other diseases	6.6	6.6	24	6,886
Ill-defined and unknown causes	*.8* [3]	3.1	3	3,188
Average number of person-years of membership	3,663	1,040,707	3,663	1,040,707

[1] Industrial injuries and venereal diseases are not included. Data include experience of 6 plants during 1946–50, and the seventh plant during 1949–50.

[2] Based on data periodically received by Division of Occupational Health, Public Health Service.

[3] Rates italicized are based on less than 5 cases.

[4] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

during 1946–50, and one plant during 1949–50, which yielded a total of 7,818 person-years of membership in sick-benefit plans, of which 5,502 person-years were for white and 2,316 were for nonwhite males.

Deaths

During the 11-year period there were 44 deaths from cancer occurring within 1 year after the chromate worker had ceased employment because of disability due to cancer. An additional 4 deaths occurred among persons disabled for more than a year. For the former group, table 7 shows the length of terminal sickness according to age and race.

It would appear that half of the white and half of the nonwhite males died in less than 100 days after becoming disabled with cancer. With increasing age there was a tendency for the length of the terminal sickness to increase.

According to site (as recorded on death certificate), respiratory cancers accounted for 16 of the 22 cases lasting less than 100 days, 12 of the 17 cases lasting 100 to 199 days, and 4 of the 5 cases lasting 200 days and over. Seven persons lived from 164 to 327 days after being disabled from respiratory cancer.

No Record of Death During Period of Study

Nine cases of sickness due to cancer originated during 1940–50 for which there was no record of fatal termination in this period. One case of stomach cancer began in 1947 and lasted 39 days. In 1949 a case of lip cancer lasted 55 days. A gastrointestinal and a respiratory cancer each caused disability lasting beyond the maximum benefit period of 98 days. The worker with the gastrointestinal cancer had not returned to work by 1951, but there was no record of his death. The worker with the respiratory cancer died in 1951. There were five cases of disability due to cancer which began during 1950. One man with gastrointestinal cancer returned to work after an absence of 57 days. Another man with cancer of the lip was disabled 11 days. Two men with respiratory cancers and one man with cancer of the prostate were still sick at the end of 1950. Sickness of these men had already lasted 6, 11, and 7 months, respectively.

Table 7. Length of terminal sickness, by age and race

Number of days disabled before death	Total	Age at death in years		
		Under 50	50–59	60 and over
	White males			
Total	24	9	8	7
Less than 100	12	6	4	2
100–199	10	3	3	4
200–365	2	0	1	1
	Nonwhite males			
Total	20	10	10	0
Less than 100	10	5	5	0
100–199	7	4	3	0
200–365	3	1	2	0

Deaths From Cancer and Other Causes

Death rates from cancer and other causes, 1940–50, are based on the same plants and the same years as in the previous section, namely, 7,818 person-years of membership. For the period covered by the sickness survey age-specific death rates have been calculated. All rates are expressed as deaths per 100,000 males on an annual basis.

Death Rates by Race and Age

It will be noted from table 8 that the cancer death rate for all males (562.8) represents 39 percent of the entire rate for all causes (1,458.2). The cancer rate for white males is 32 percent and for nonwhite males is 51 percent of the corresponding total death rates. At ages 45–54 and 55–64 years the cancer death rate among nonwhite chromate workers is higher than the rate for all other causes. In the general population of the United States the death rate from cancer had not reached one-fifth of the total rate even in those age groups where cancer is most important.

A racial comparison of cancer death rates shows a rate of 133.8 for whites under 35 years of age and 1,579.0 for those 65 years of age and over, with no deaths among nonwhites

observed in these age groups. In the most important productive years, namely, 35–44 and 45–54, the cancer rate for nonwhites was more than three times the rate for whites, and at 55–64 years it is more than double.

Death Rates by Race and Detailed Cause

Table 9 gives the number of deaths and death rates per 100,000 male chromate workers by race and specific cause. Of interest is the difference in the classification of causes of death by system for the white and for the nonwhite males.

Of the 75 deaths among white males, 34 (45 percent) were due to diseases of heart, arteriosclerosis, cerebral hemorrhage, and thrombosis, and yielded a total rate of 617.9. Nineteen (25 percent) were due to diseases of the respiratory system, including cancer of respiratory system, 14; tuberculosis of respiratory system, 2; and other respiratory diseases, 3. These diseases yielded a total rate of 345.3. Diseases of the digestive system, including cancer of digestive organs and peritoneum, caused 6 deaths; cirrhosis and other diseases of liver, 3; and other digestive diseases, 2; a total of 11, or a rate of 200.0 deaths per 100,000 white males. Of the remaining 11 deaths, 1 was due to cancer of nasopharynx, 1 to cancer of genitourinary organ, 1 to leukemia, 1 to Hodgkin's disease, 1 to nephritis, 1 to alcoholic psychosis, 1 to diabetes, 3 to nonindustrial injuries, and 1 to an ill-defined cause.

Table 8. Deaths from all causes and from cancer, according to age, by race [1]

Age group, by years	Annual number of deaths per 100,000 males [2]			Number of deaths [2]			Average number of person-years of membership
	All causes	Cancer, all sites	All other causes	All causes	Cancer, all sites	All other causes	
	All males						
All ages	1,458.2	562.8	895.4	114	44	70	7,818
Under 35	402.7	89.5	313.2	9	2	7	2,235
35–44	709.2	221.6	487.6	16	5	11	2,256
45–54	1,908.2	928.3	979.9	37	18	19	1,939
55–64	3,465.8	1,352.5	2,113.3	41	16	25	1,183
65 and over	5,365.8	1,463.4	3,902.4	11	3	8	205
	White males						
All ages	1,363.1	436.2	926.9	75	24	51	5,502
Under 35	334.4	133.8	200.6	5	2	3	1,495
35–44	517.5	129.4	388.1	8	2	6	1,546
45–54	1,335.4	471.3	864.1	17	6	11	1,273
55–64	3,406.8	1,102.2	2,304.6	34	11	23	998
65 and over	5,789.5	1,579.0	4,210.5	11	3	8	190
	Nonwhite males						
All ages	1,683.9	863.5	820.4	39	20	19	2,316
Under 35	540.5	0	540.5	4	0	4	740
35–44	1,126.8	422.5	704.3	8	3	5	710
45–54	3,003.0	1,801.8	1,201.2	20	12	8	666
55–64	3,783.8	2,702.7	1,081.1	7	5	2	185
65 and over	0	0	0	0	0	0	15

[1] Industrial injuries are not included. Data include experience of 2 plants during 1940–50, 1 plant during 1943–50, 3 plants during 1946–50, and 1 plant during 1949–50.

[2] 11 members who had been disabled more than 1 year and died during 1940–50 are not included. Of these, 4 white members died of cancer; 4 white and 3 nonwhite members died of other causes.

Table 9. Deaths from cancer (by site) and from other causes, by race [1]

Cause	Annual number of deaths per 100,000 males [2]			Number of deaths [2]		
	All males	White	Nonwhite	All males	White	Nonwhite
All causes	1,458.2	1,363.1	1,683.9	114	75	39
Cancer, all sites	562.8	436.2	863.5	44	24	20
Respiratory system	409.3	254.4	777.2	32	14	18
Digestive organs and peritoneum	89.5	109.1	43.1	7	6	1
Buccal cavity and pharynx	25.6	18.2	43.2	2	1	1
Genitourinary organs	12.8	18.2	0	1	1	0
Leukemia and Hodgkin's disease	25.6	36.3	0	2	2	0
Diseases of heart and arteriosclerosis	383.7	454.3	215.9	30	25	5
Cerebral hemorrhage and thrombosis	127.9	163.6	43.2	10	9	1
Tuberculosis of respiratory system	102.3	36.3	259.1	8	2	6
Other respiratory diseases	76.8	54.6	129.5	6	3	3
Cirrhosis and other diseases of liver	38.3	54.5	0	3	3	0
Other digestive diseases	25.6	36.4	0	2	2	0
All other diseases	64.0	72.7	43.2	5	4	1
Nonindustrial injuries	76.8	54.5	129.5	6	3	3

[1] Industrial injuries are not included. Data include experience of 2 plants during 1940–50, 1 plant during 1943–50, 3 plants during 1946–50, and 1 plant during 1949–50.

[2] 11 members who had been disabled more than 1 year and died during 1940–50 are not included. Of these, 4 white members died of cancer; 2 white and 2 nonwhite members died of tuberculosis of respiratory system; 2 white members died of heart disease, and 1 nonwhite member died of pneumonia.

NOTE: Average number of person-years of membership: white, 5,502; nonwhite, 2,316.

Of the 39 deaths among the nonwhites, 27 (69 percent) were due to diseases of the respiratory system, including cancer of the respiratory system, 18; tuberculosis of the respiratory system, 6; and other respiratory diseases, 3. The total rate for diseases of the respiratory system, cancerous and noncancerous, was 1,165.8 deaths per 100,000 nonwhite males. Six deaths due to diseases of heart, arteriosclerosis, cerebral hemorrhage, and thrombosis yielded a total rate of 259.1 per 100,000 nonwhite males. Of the remaining 6 deaths, 1 was due to cancer of the digestive system, 1 to cancer of nasopharynx, 1 to meningitis, and 3 to nonindustrial injuries.

Comparative Mortality

The frequency of respiratory cancer apparently was above normal among chromate workers. Hence, an estimate of the excess in the number of deaths should be of interest. In table 10, death rates based upon the white and nonwhite male population of the United States, 1940–48, are compared with death rates for similar age groups among chromate workers.

During the 9-year period 1940–48, two plants reported during 1940–48; one plant, during 1943–48; and three plants, during 1946–48. The number of person-years of membership in sick-benefit plans for each of the five age groups is shown in table 11.

Only in the oldest age group, 65–74 years, in the population of the United States were there an appreciable number of males not in the labor force; thus, the death rates for males aged 15 to 74 are based essentially on the working population. Because of the small number of person-years of membership in sick-benefit plans among chromate workers, attention should be centered on general trends rather than on particular age-specific rates.

Deaths Among All Males

In table 10 it will be noted that among all males the ratio of actual to expected number of deaths from all causes except cancer declines steadily with advancing age until it becomes favorable for chromate workers. For cancer, all sites, the actual number of deaths was approximately four and one-half times the number that would have been expected, based upon occurrence in the total male population of the

Table 10. Death from cancer and from all causes except cancer among males in chromate-producing industries and among all United States males, according to age, by race [1]

Cause of death and age group, in years	Ratio of actual to expected number of deaths	Number of deaths		Annual number of deaths per 100,000 males	
		Actual	Expected [2]	Chromate	United States [3]
	Chromate				
	All males				
All causes, except cancer					
Total, 15–74	1. 16	51	44. 0	923. 6	797. 5
15–34	2. 63	5	1. 9	317. 6	121. 8
35–44	1. 69	10	5. 9	618. 8	366. 6
45–54	1. 17	15	12. 8	1, 063. 1	905. 5
55–64	1. 10	17	15. 4	2, 135. 7	1, 940. 7
65–74	. 75	4	5. 3	3, 200. 0	4, 238. 7
Cancer, all sites					
Total, 15–74	4. 44	32	7. 2	579. 5	130. 3
15–34	20. 00	2	. 1	127. 1	9. 1
35–44	5. 00	3	. 6	185. 6	39. 3
45–54	7. 50	15	2. 0	1, 063. 1	140. 4
55–64	3. 45	10	2. 9	1, 256. 3	363. 6
65–74	2. 22	2	. 9	1, 600. 0	757. 9
Cancer of respiratory system, except larynx					
Total, 15–74	28. 89	26	. 9	470. 8	16. 7
15–44	40. 00	4	. 1	125. 4	2. 5
45–54	30. 00	12	. 4	850. 5	25. 8
55–74	20. 00	10	. 5	1, 085. 8	57. 2
Cancer, all other sites					
Total, 15–74	. 95	6	6. 3	108. 7	113. 6
15–44	2. 00	1	. 5	31. 3	15. 7
45–54	1. 88	3	1. 6	212. 6	114. 6
55–74	. 49	2	4. 1	217. 1	448. 5
	White males				
All causes, except cancer					
Total, 15–74	1. 24	36	29. 1	941. 6	760. 6
15–34	2. 00	2	1. 0	192. 1	98. 8
35–44	1. 76	6	3. 4	550. 0	312. 0
45–54	1. 07	8	7. 5	870. 5	816. 5
55–64	1. 31	16	12. 2	2, 427. 9	1, 857. 3
65–74	. 85	4	4. 7	3, 539. 8	4, 167. 1
Cancer, all sites					
Total, 15–74	2. 94	15	5. 1	392. 4	133. 6
15–34	20. 00	2	. 1	192. 1	9. 2
35–44	2. 50	1	. 4	91. 6	38. 3
45–54	3. 08	4	1. 3	435. 3	137. 1
55–64	2. 50	6	2. 4	910. 5	365. 7
65–74	2. 22	2	. 9	1, 769. 9	774. 8

See footnotes at end of table.

Continued ▶

Table 10. Deaths from cancer and from all causes except cancer among males in chromate-producing industries and among all United States males, according to age, by race [1]—Continued

Cause of death and age group, in years	Ratio of actual to expected number of deaths	Number of deaths		Annual number of deaths per 100,000 males	
		Actual	Expected [2]		
	Chromate			Chromate	United States [3]
	White males				
Cancer of respiratory system, except larynx					
Total, 15–74	14. 29	10	. 7	261. 6	17. 4
Cancer, all other sites					
Total, 15–74	1. 14	5	4. 4	130. 8	116. 2
	Nonwhite males				
All causes, except cancer					
Total, 15–74	. 77	15	19. 5	882. 9	1, 149. 7
15–34	1. 76	3	1. 7	562. 9	316. 2
35–44	. 87	4	4. 6	761. 9	869. 7
45–54	. 77	7	9. 1	1, 422. 7	1, 845. 6
55–64	. 24	1	4. 1	929. 9	2, 974. 0
65–74	----------	0	. 6	0	5, 206. 5
Cancer, all sites					
Total, 15–74	10. 00	17	1. 7	1, 000. 6	98. 5
15–34	----------	0	----------	0	8. 6
35–44	6. 67	2	. 3	381. 0	49. 3
45–54	12. 22	11	. 9	2, 235. 8	174. 4
55–64	8. 00	4	. 5	2, 919. 7	336. 6
65–74	----------	0	. 1	0	529. 5
Cancer of respiratory system, except larynx					
Total, 15–74	80. 00	16	. 2	941. 7	10. 0
Cancer, all other sites					
Total, 15–74	. 67	1	1. 5	58. 9	88. 5

[1] Violent and accidental deaths are not included. Data for chromate workers include experiences of 2 plants during 1940-48, 1 plant during 1943-48, 3 plants during 1946-48.

[2] The average death rate for the United States for the 9 years, 1940-48, multiplied by the appropriate person-years of membership in the chromate plants.

[3] Data are from references *2*, *3*, and *4*.

United States. When cancer of the respiratory system was observed separately, the excess for chromate workers was greatly increased. Nearly 29 times as many deaths due to respiratory cancer were found as would have been expected. For three ascending age groups, respiratory cancer was 40, 30, and 20 times as common among male chromate workers as among other males. All other types of cancer failed to show an excess among chromate workers.

Deaths Among Males, By Race

A comparison of respiratory cancer deaths, by race, shows that the ratio of actual to expected number was 14.29 for whites and 80.00 for nonwhites. On the other hand, the ratio of actual to expected deaths from cancer of all

Table 11. Person-years of membership in sick-benefit plans, by age and race

Race	Age, in years					
	Total 15–74	15–34	35–44	45–54	55–64	65–74
All males	5, 522	1, 574	1, 616	1, 411	796	125
White	3, 823	1, 041	1, 091	919	659	113
Nonwhite	1, 699	533	525	492	137	12

other sites was about what would be expected for whites (1.14), but was less than expected for nonwhite chromate workers (0.67).

For all causes of death except cancer the death rate for whites (941.6) was somewhat over, and the death rate for nonwhites (882.9) was somewhat under, that found in the general population (760.6 and 1,149.7, respectively). With advancing age, chromate workers of both races showed a decreasing trend in the ratio of actual to expected deaths from causes other than cancer.

The number of recorded deaths from respiratory cancer among the chromate workers is minimal for the following reasons:

1. Deaths of employees who were not members of a sick-benefit association are not included.
2. Persons who worked in chromates but left the industry prior to their terminal illness are not included.
3. Members who died over a year after onset of disability due to cancer are not included.
4. Several members who had a clinical course consistent with the presence of cancer of the respiratory tract are not included because cancer was not recorded on their death certificates.
5. Some members whose deaths were not recorded as cancer died without a complete medical examination or biopsy.

Summary

The morbidity and mortality experience of male members of sick-benefit associations in seven chromate-producing plants are described. Sickness among a group of white male chromate workers was compared with that of a large group of industrial workers. It was observed that the annual number of cases of sickness and nonindustrial injuries per 1,000 white males was 116.3 for chromate workers and 108.4 for other industrial workers.

For all specific causes except cancer the chromate workers had frequency rates that were not greatly different from other workers. Cancer, with a rate of 7.1 for chromate workers compared with 0.7 for workers in other industries, stands out as markedly in excess for chromate workers.

The frequency of sickness among chromate workers has shown a trend downward during the past 5 years. The most marked decline has occurred among respiratory diseases.

Nonwhite chromate workers under 55 years of age had a higher rate for sickness and nonindustrial injuries than had the white workers. For cases lasting 8 days or longer the former had a frequency rate of 156.7 per 1,000 compared with 86.2 for the latter.

During the 9-year period 1940–48, the average annual death rate per 100,000 males aged 15 to 74 years for all causes was 1,503.1 for chromate workers and 927.8 for the corresponding male population of the United States; for all causes except cancer the death rates were 923.6 and 797.5, respectively.

For cancer, all sites, the actual number of deaths of chromate workers was approximately four and one-half times the number that would have been expected had the cancer rates for all males in the United States prevailed. When cancer of the respiratory system was observed separately for chromate workers, nearly 29 times as many deaths as were expected were found. Deaths from all other types of cancer failed to show an excess among chromate workers. A racial comparison of respiratory cancer deaths showed that the ratio of actual to expected number of deaths was 14 for whites and 80 for nonwhites; for cancer, all other sites, the two ratios were markedly lower.

ACKNOWLEDGMENTS

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Body's Ability to Handle Fats

The identification and partial purification of two plasma components and one tissue component, which act in conjunction with heparin to clear lipoproteins produced in blood by heavy fat diets, has been accomplished by scientists at the National Heart Institute, National Institutes of Health, Public Health Service. Physical studies of plasma, employing a fast-spinning ultracentrifuge, indicate that clusters of low-density lipoprotein molecules are broken down into smaller components as a result of chemical reaction in the blood serum when suitable amounts of those components are added.

Important in the study of the causes and treatment of hardening of the arteries, these findings, which stem from research on the role of heparin in the body's ability to handle fat, are preliminary. Additional studies are needed before the data can be fully interpreted.

Accumulated evidence, substantiated by this study, strongly indicates that enzyme and hormonal factors play an important part in the clearance of lipoproteins in the blood, and suggests, therefore, that diet may not be the only factor—and possibly not even an important factor—in the body's ability to handle fats.

The scientists point out that although the means are available, the manufacture of a clearing factor in the body may only occur in response to the need at the time. The defect in metabolism may, therefore, lie in the inability of the mechanism to spring into action. This may be due to lack of one or more of the necessary factors involved in the clearing reaction.

A complete report of the research study was published in *Science*, May 30, 1952.

A New Antituberculosis Drug?

By ROBERT J. ANDERSON, M.D.

Announcement of the use of isonicotinic acid hydrazide (isoniazid) in the treatment of tuberculosis caused immediate and widespread reactions. The reports, published by New York newspapers at the end of February 1952, were accepted by the public with understandable enthusiasm. The professional attitude, however, was one of cautious open-mindedness. Aware that the limited clinical trial of the new drug was insufficient, the professional societies concerned at once warned the public against undue optimism.

"The introduction of a new drug in the therapy of tuberculosis is likely to raise more questions for a few years than it will answer. There is no knowledge at the present time that isonicotinic acid hydrazide or its isopropyl derivative will accomplish more than has been accomplished with streptomycin and PAS. It may prove to be an additional drug of great value. It may be years before its exact contribution to the therapy of tuberculosis can be assessed accurately." Thus spoke the American Trudeau Society.

The American College of Chest Physicians observed: "There has not been enough work or enough cases treated to be able to determine how this drug will fit into the present-day treatment of tuberculosis. If all the promise of effectiveness is fulfilled, this drug can do no more than add another weapon to those already used by chest specialists in the treatment of tuberculosis. Whether this drug will extend the scope of treatment, decrease the time required, or change the approach to certain types of the disease has yet to be determined. It appears to hold great promise but should not be used as regular treatment in new cases until a great deal more is known about it and its reaction in the human being."

Dr. Anderson is chief of the Division of Chronic Disease and Tuberculosis, Public Health Service. *This paper is an expansion of his remarks at a panel discussion at the forty-eighth annual meeting of the National Tuberculosis Association at Boston, May 26, 1952.*

Cooperative Research

Seeking answers to such questions, and to others, the Division of Chronic Disease and Tuberculosis is conducting a comparative research project in cooperation with 22 tuberculosis hospitals. To evaluate the new drug, comparisons are being made between results obtained with isoniazid, alone and in combination with streptomycin, and results of treatment with a combination of streptomycin and PAS (para-aminosalicylic acid).

We hope to learn the comparative effectiveness of the new drug on the forms of pulmonary tuberculosis which comprise the majority of cases in this country. The study is planned not only to measure the influence of the different regimens on weight, temperature, disappearance of the bacillus, and X-ray changes, but also to learn about organisms resistant to the drugs, the success or failure of treatment, and death rates. We are particularly interested in knowing whether isoniazid will be useful for streptomycin-sensitive patients and those with streptomycin-resistant bacilli. Among 1,100 patients treated in the first 5 months of the study, 40 percent were streptomycin-resistant.

The pattern of cooperative research we are using is one which the Division of Tuberculosis

developed in 1949 for testing streptomycin therapy. A similar research project in 1950 studied the combined effect of streptomycin and PAS, a combination now widely used against tuberculosis. A number of hospitals pool their cases and cooperate in one coordinated investigation. In a relatively short time observations on groups of comparable cases can be assembled in numbers large enough to yield decisive results.

The protocol of the isoniazid study was agreed upon in advance by the participating clinicians, who report their observations every 4 weeks to our office, where they are analyzed statistically. The names of patients to be included in the study are submitted to the central office in order that the patients may be placed on a treatment course which is determined by random allocation. Each patient is placed on one of the drug regimens, and will receive such other treatment as his physician prescribes. Only patients with X-ray evidence of pulmonary tuberculosis and positive bacteriology are eligible, and provision has been made to keep the welfare of the patients paramount without jeopardizing the validity of the study. Each will be treated with the drugs for 40 weeks and watched for an additional 24 weeks.

Future Implications

Until studies such as this are completed, any comments about the future implications of isoniazid must necessarily be highly speculative. We are dealing with a chronic disease of very long course, characterized by a wide range of possible manifestations, slow response to therapy, relapses, and prolonged treatment. Until much more evidence is in, we can only hazard guesses. The effect of isoniazid and the permanency of that effect on the patient's disease have not yet been determined. Drug-resistant bacilli already have been reported. There are many other important questions still unanswered. On the other hand, we must be alert to utilize even partial knowledge of the drug; even interim findings may be valuable.

Even in the event that the new drugs prove to be extremely efficacious, the program of tuberculosis control through public health measures will not be altered appreciably, in my judgment. The principal effects of isoniazid most probably will be to make case finding and hospitalization even more urgent.

Isoniazid brought tuberculosis dramatically to the attention of the general public, many of whom believed the disease had been vanquished years ago. I think we would be wise to make capital of the renewed interest in tuberculosis which announcement of the drug has stimulated. If isoniazid disappoints us, as other therapies have disappointed us and our patients in the past, the extra vigor we invest now in case finding will tend to offset the let-down in public interest which may come in the future. And if isoniazid lives up to its early promise, as we all hope, surely we will want to strengthen and extend our efforts, so that all who need it may have the new treatment.

The implications of isoniazid for hospitals are not clear at this early stage. But if we assume that no toxic properties will be revealed and that resistance can be dealt with, then the properties claimed for the drug—that it reduces fever and restores appetite—alone would make it useful. If therapy with isoniazid requires less time than present therapeutic methods, turn-over in hospitals could conceivably be rapid. To the extent that it shortens the length of patient stay, the new drug could reduce the number of hospital beds needed.

Effective as they are in preventing or postponing death, streptomycin and PAS prolong hospital stay and also cause more patients to seek hospital care. In addition, some patients are so benefited that other forms of therapy, including surgery, can be employed. Therefore, unless it is rapid in action, an improved therapy very probably would aggravate the shortage of tuberculosis beds. For the same reasons, the number of cases requiring supervision by health departments would be increased correspondingly.

Measuring Control

The assertion is sometimes made that tuberculosis is a disappearing disease in this country. In large part, such views are based on the trend of mortality, which has been dramatically downward. Nevertheless, tuberculosis remains the seventh leading cause of death and the only

communicable disease among the first 10 causes of death. In the age group 15 to 34, tuberculosis is the leading cause of death from disease. From the standpoint of mortality then, the "disappearance" of tuberculosis seems to have been more advertised than achieved.

In any event, the dimensions of the tuberculosis control problem are seen more realistically when viewed in the light of morbidity data. The best estimate is that there are now 1,200,000 people in this country with tuberculosis, who may be placed in four groups. First there are the 500,000 persons with tuberculosis who are known to their health departments. Half of these are active cases. In addition, an estimated 700,000 persons with either active or inactive tuberculosis are not known to any health department.

Only 105,000 of the 250,000 persons known to have active tuberculosis are in hospitals now. Among the 145,000 known active cases of tuberculosis who are not hospitalized are 40,000 persons with positive sputum. These are the patients for whom additional beds are urgently needed. Then there are about 30,000 persons whose tuberculosis seems to be progressing, according to X-ray, although their sputum was negative when last tested. The remaining 75,000 persons with known active tuberculosis who are at home have not had a sputum examination reported during the past year.

Whether mortality or morbidity is used as a measure, tuberculosis is still far from controlled in the United States, despite all of the efforts directed against it by the health professions. To deal with a public health problem of this magnitude, the Nation obviously needs more tuberculosis beds, more clinics and equipment, more and better-trained health department personnel. The development of improved therapeutic methods emphasizes these pressing needs.

PHR

Trend in Hospital Utilization, 1951

A new high in hospital admissions was reached in the United States in 1951, according to the report on hospital services by the Council on Medical Education and Hospitals of the American Medical Association. During the year, 18 million patients were admitted to 6,637 hospitals, a rate of one every 1.75 seconds. More than 427 million patient-days of care were recorded.

Hospital births also set new records in 1951. Three million births, almost 90 percent of the total recorded, took place in hospitals, the association report states.

Needed Improvements in Mortality Data

By IWAO M. MORIYAMA, Ph.D.

In reviewing the 50-year history of national mortality statistics in the United States, one is impressed by the fact that death statistics have not changed basically since 1900. However, this does not mean that progress was not made in the development of mortality statistics. Perhaps the most important of these developments was the growth of the registration area into a federated system of vital records and statistics with a nation-wide coverage. Another major advance was the establishment in 1937 of place-of-residence data on an annual basis for each area in the country.

The availability of data on a routine basis over a relatively long period, for small geographic areas, and in considerable detail as to cause is perhaps the most important factor in the widespread use of mortality statistics. Mortality statistics are frequently utilized as a substitute for morbidity statistics. The validity of this type of use is open to question, particularly when diseases with low fatality rates are under study. For example, one could hardly expect to measure the prevalence of rheumatic fever, or the mental disease problem, or the nutritional status of the population by the use of mortality statistics. On the other hand, mortality data still provide the best available index of incidence of a number of communicable diseases.

The quality of mortality statistics has improved markedly over the past 50 years. The International List of Causes of Death, through its decennial revisions, has kept pace with medical progress, and medical certifications of causes of death have greatly improved. Medical returns are more complete, as indicated by the increase in multiple-cause reporting from 35 percent in 1917 to 55 percent in 1940. It is expected that in 1950 the proportion of multiple-cause reporting will prove to be in the neighborhood of two-thirds of all deaths. The percentage of ill-defined and unknown causes has been declining steadily—an indication of the improvement in the quality of cause-of-death reporting.

Despite the progress made in the development of mortality statistics over the years, there are a number of defects that seriously limit the usefulness of the data. If mortality statistics are to continue to serve as tools in public health programs, there need to be further improvements in the quality of the basic data. The scope of public health problems cannot be precisely defined, nor can programs be planned or evaluated effectively with imperfect tools. It is also important that there be extensions in the use of data that can be obtained from the death registration document. Lastly, there needs to be development of new information using the death certificate as the starting point.

Needed Improvements in Quality of Data

Death Registration

One of the basic defects in many geographic areas is the incompleteness of death registration. Although the completeness of death registration has never been precisely measured, there is evidence that many deaths are not regis-

Dr. Moriyama is chief of the mortality analysis branch, National Office of Vital Statistics, Public Health Service. *This paper was presented at the Second Conference on Public Health Statistics at the University of Michigan School of Public Health, Ann Arbor, June 18, 1952.*

tered. This, despite the fact that the law usually requires the filing of a death certificate in order to secure a burial permit. An examination of the death rates for any number of counties will show crude death rates of much lower magnitude than can be accounted for on the basis of known mortality levels and age distribution of the population. In many instances, it is almost impossible to interpret the death rates for small areas because of incomplete registration. Since public health programs are carried out in the local areas, improvement in death registration is essential if valid data are to be available for program planning and program evaluation.

Place of Residence

In addition to complete registration, there needs to be further study of the problems of residence allocation. Since data by place of residence are generally used as an index of mortality in a community, accurate classification of data is essential. This is not a simple problem because the "usual place of residence" is not as clear cut or definitely determinable as the place of death. A study of this problem is being initiated, and it is hoped that the results will be useful in clarifying the situation with respect to the kind of information being reported as the place of residence, and how accurately such events can be classified.

Intercensal Population Estimates

Population estimates are not a problem in mortality statistics, but they should be mentioned here because the availability of reliable annual estimates of population, particularly for small areas, will extend the usefulness of mortality data. Reliable population data are needed more than once a decade.

Accuracy of Information

There are several items on the death certificate for which more complete and accurate information is needed. Mention has already been made of the usual-place-of-residence item. The others of special interest are the statements of age, marital status, occupation and industry, and the medical certification of causes of death.

Misstatements of age, particularly for those around age 65, are becoming of increasing importance because of their effect on death rates for the older population. Unless the population data contain the same proportionate bias as mortality data, death rates for studies of mortality in the aging population will be misleading.

Statistics on causes of death are used more extensively to define health problems than any other kind of mortality data. For precision in definition, further improvements in medical certification are needed. To close the gap between the needs and the work currently being done in this area, the Public Health Conference on Records and Statistics is recommending to all States that an intensive program be carried on over the next 2 years to secure improvements in medical certification.

The quality of cause-of-death reporting today varies considerably from area to area. For the country as a whole, it is estimated that perhaps 20 percent of the medical returns are not properly made. At the fourth annual meeting of the Public Health Conference on Records and Statistics, in Washington, March 25–28, 1952, Florence Olson reported to the mortality statistics working group that, in a recent survey of State cause-of-death query programs, it was found that the State vital statistics offices were querying, on the average, about 3 percent of the cause-of-death statements.

The classification of causes of death has been put on a sounder basis, but the benefits of this change cannot be fully realized until more reporting physicians assume fully their responsibility. The certifying physician must now be concerned with how the causes of death are reported as well as what should be certified. A number of tools, such as a filmstrip on medical certification of causes of death, and new procedures for querying causes of death, have been developed to bring to physicians the proper method of medical certification. Vital statistics offices should make more effective use of these tools and develop others to secure needed improvements in the quality of cause-of-death statistics. In this connection, it is hoped that more local health officers will become actively engaged in informing the medical practitioners in their areas of the proper method of medical certification. Routine examination of death certificates will indicate local problems. Dis-

cussion of these problems with individual physicians, or before the medical society and hospital staff, has been effective in securing almost immediate improvement in the quality of medical certification.

Accuracy of Diagnoses

The death certificate even under ideal conditions can do no more than register the physician's knowledge and medical opinion regarding causes of death. In interpreting statistics derived from these reports, it is important to know about the reliability of medical diagnoses. This is obviously not a statistical problem but a medical one. Also, it is a problem that will always exist in one degree or another no matter how much medical progress is made. Although the actual numbers of deaths from particular diseases are of interest to public health program directors, the establishment of the "true" numbers of deaths or death rates is not practical, except in rare instances. However, it does seem feasible to make an evaluation of medical diagnoses from a sample of death certificates. If the death occurred in a hospital, a follow-back can be made to the hospital records and to autopsy reports if a necropsy has been performed. In other cases, the follow-back can be made to the certifying physician. In these follow-backs, information would be collected which would permit some evaluation of the accuracy of diagnoses.

Causes of Fetal Deaths

With the great progress made in the saving of infant lives, it is expected that attention will be shifted to a public health problem of great magnitude—fetal deaths. Data are not yet available to measure the size of this problem, but estimates indicate that the annual fetal loss is much greater than that ever caused by infant deaths. The World Health Organization has recommended that statistics be compiled on the fetal death problem.

Little is known about the causes of fetal deaths. Experimental studies are now under way to determine the best method for collecting data on this subject. The problem here is not simple since the fetus cannot be observed clinically. It is hoped that eventually the statistics on fetal deaths will be as useful as general mortality statistics.

Extending Use of Available Data

There are still some opportunities for extension of mortality data from information available on the death certificate but not regularly processed into statistical tables. The most useful data not tabulated regularly are those related to multiple causes of death, mortality statistics by social classes, mortality experience of industrial groups, and statistics from the matching of birth and death records.

Multiple-Cause Tabulations

A good deal of medical information is available on the death certificate. When more than one cause of death is reported and only one cause is tabulated, then only a segment of the reported information is used. Also, single-cause tabulations limit the interpretation of cause-of-death statistics.

Multiple-cause tabulations provide information on the various diseases or conditions contributing to death. A count of diseases or conditions is made without regard to individuals, whereas the single-cause tabulations represent counts of individuals who died as a result of a particular cause that initiated the train of morbid events leading to death. Roughly speaking, multiple-cause tabulations show diseases and conditions present at the time of death or associated with the death; primary mortality tabulations indicate deaths from a particular disease or condition.

The results of a full-scale study of multiple causes of death are not yet available. However, a preliminary report of the study being conducted by the Illinois State Health Department was presented by John H. Vinyard to the mortality working group of the Public Health Conference on Records and Statistics at their meeting in Washington, March 25–28, 1952. In coding death certificates for the period April to June 1951, it was found that of the 22,481 death records involved, 11,616, or 52 percent of the total for the period, reported deaths due to multiple causes. Also, there were 15,910 causes certified in addition to the 22,481 causes which are classified as the underlying cause of death.

The table shows selected causes taken from Vinyard's report. It may be seen that there were 442 deaths assigned to pulmonary tuberculosis as the underlying cause. In addition, 58 cases of pulmonary tuberculosis were involved in the deaths. Syphilis was the underlying cause in 97 deaths, and it was also a contributory cause or mentioned as a cause of death on 53 other occasions. Diabetes was coded as the underlying cause in 399 deaths, but it was a contributory condition in 491 other deaths. From this, it may be presumed that there were at least 890 diabetics that died in this period. Deaths resulting from hypertension without heart disease numbered only 173, but there were 1,565 other instances in which hypertension without heart disease was mentioned on the death certificate. As might be expected, the chronic diseases which might be lost from primary mortality tabulations appear most frequently in multiple-cause tabulations.

The full use of available medical information is becoming increasingly important with the shift in emphasis from the acute to the chronic diseases. In chronic diseases, in which various conditions arise from a number of causes, it is possible to count such conditions without regard to the underlying cause. Tabulations can also be made to indicate the sequence of events or the association of diseases. Multiple-cause tabulations will also answer such questions as how frequently a specific disease is involved—whether as the underlying cause, a complication, or as a contributory cause. They also answer such questions as the number of deaths of diabetic and of tuberculous persons.

The compilation of multiple-cause statistics is not a simple task. There are a number of mechanical problems and analytical approaches to be worked out. However, the possibilities afforded in answering a variety of questions concerning diseases are great.

Statistics by Social Classes

The biggest gap today in mortality statistics is the lack of social and economic data related to mortality; 1950 is the first year for which a nation-wide study on this subject is being made. A number of State health departments are also conducting studies of occupational and industrial mortality for deaths occurring in 1950. It is hoped that revival of interest in this area

Multiple causes of death for selected underlying causes, deaths in Illinois, April–June, 1951

Cause of death	Underlying cause	Other causes										
		Total	001–008	020–029	140–205	260	330–334	420–422	440–443	444–447	450	Residual [1]
All causes	22,481	15,910	58	53	205	491	1,051	1,971	629	1,562	2,994	6,896
Pulmonary tuberculosis (001–008)	442	110	-----	6	4	11	2	22	2	------	4	59
Syphilis and its sequelae (020–029)	97	72	1	-----	1	1	3	15	2	6	22	21
Malignant neoplasms (140–205)	3,588	1,503	11	2	4	48	47	268	36	40	104	943
Diabetes mellitus (260)	399	563	4	1	6	-----	65	175	29	37	113	133
Vascular lesions of central nervous system (330–334)	2,398	2,810	-----	8	27	63	1	129	40	901	1,193	448
Arteriosclerotic and degenerative heart disease (420–422)	7,581	5,121	20	20	87	225	352	553	402	413	1,019	2,030
Hypertensive heart disease (440–443)	1,346	1,026	3	3	9	37	346	18	-----	------	226	384
Hypertension without heart disease (440–447)	173	120	2	-----	4	7	15	5	-----	3	23	61
General arteriosclerosis (450)	435	316	-----	1	6	13	6	23	-----	7	------	260
Residual [1]	6,022	4,269	17	12	57	86	214	763	118	155	290	2,557

[1] Excludes suicide, 963, 970–979; homicide, 964, 980–985; and ill-defined and unassigned causes, 780–785, which are not suitable for multiple-cause tabulations.

will bring useful information into the planning of health programs.

Mortality of Various Industrial Groups

Related to the occupational returns on the death certificate is an item on industry or business. The classification of the industry in which the decedent was employed provides data on the mortality experience of the various industrial groups. Puffer (*1*), in Tennessee, has tabulated mortality data for specific industrial plants, and reported that those tabulations have been utilized to great advantage in the industrial hygiene program.

Although the hazards of certain industries will be reflected in these statistics, they, like the occupational mortality data, do not give a direct measure of the mortality risk in various industries. However, they do provide an important index of mortality of a population group. This information should be extremely valuable in the case-finding activities of health departments.

Matched Birth and Death Records

A number of States match infant and maternal death records with birth certificates as a routine check on birth registration. Some of these States go a step further to prepare statistical tabulations on the basis of these matched records. Recently, the Public Health Conference on Records and Statistics proposed that national tabulations be prepared on matched records involving neonatal deaths. Some 14 States are now contributing to this set of tabulations.

The use of matched birth and death records is a simple extension of currently available data which provide additional information of value to maternal and child health programs. For example, it will be possible to determine the effect of birth weight on the survival of the infant. Birth order of the child is another variable of importance in maternal deaths and possibly in infant mortality. The information on complications of pregnancy and labor which is being developed on the birth record may shed additional light on the infant mortality problem. Possibly, leads from this type of data will help close the chapter on infant and maternal mortality as major public health problems.

Development of New Information

The death certificate is primarily a legal document. As such, it is important that its content not be overburdened with statistical items. There is always a temptation to add more and more medical or statistical items to the death certificate. Although it would be convenient to obtain statistics routinely in this way, it is difficult to justify the use of the death certificate for this purpose.

A slightly less convenient, but a more desirable approach to securing new information, is to use the death certificate as the starting point and follow back for additional information to the physician or the informant named on the death certificate. Collection of data in this manner is in many ways preferable to loading up the death certificate with information which is not pertinent to its legal use.

By use of the follow-back procedure, it is possible to obtain specific medical information from the hospital and/or from the certifying physician. The supplemental data may relate to illness history, verification of the diagnosis, and other facts about medical care and hospitalization. Certain other pertinent social facts, such as economic status, medical costs, education, and number of dependents, may be secured from the family.

A study of this kind would have to be directed at specific diseases or groups of diseases. In many instances, it would be on a sample basis. Included in the study should be factors that will materially broaden the base of interpretation of mortality data for use in program planning.

Other Areas Needing Improvement

Statistical activities may be viewed in two ways. The first aspect, the collection of statistics, has already been discussed. The second, the analytical phase, brings out the meaning in the statistics. All too often the end result of a statistical activity is a voluminous set of tables. While the vital statistics offices have a primary responsibility for providing reference tables for the use of others, a good deal can be done in the reduction, or digesting, of the data. More intensive work along these lines is needed. The removal of the wheat from the chaff not only

eliminates useless tabulations, but also points to needed improvements in the data as well as to new areas for study. More important, data in usable form lead to interpretations which can be utilized in public health programs.

In many areas, vital statistics are an integral part of the activities of the health department. In others, the vital statistics activities appear to be merely housed in the health department. This detachment is helpful in maintaining a strictly objective attitude toward the data, but it does not discharge the responsibilities of the statistical office. Mortality statistics are tools to be used in planning and evaluating public health programs, and statistical findings are of no value if they are modestly hidden. There should also be more knowledge of program needs and anticipation of these needs by statisticians. If the statistical offices can be adequately staffed by competent personnel, sound bases for the planning of health programs can be developed.

Insofar as mortality statistics are concerned, it seems fair to say that they are here to stay, despite the crying need for morbidity statistics. There are many areas in death statistics that need improvement. New statistics should be developed to meet health program needs. There is life in mortality statistics waiting to be brought out by the statistician, and to be used by the administrator and program directors.

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A Program of Conservation Irrigation

The headquarters of the newly established water projects section of the Public Health Service Communicable Disease Center has been opened in Salt Lake City, Utah. In the western United States, where the program will operate in 17 States, one of the major health problems and a major goal of the new office is the control of mosquitoes.

The section will cooperate with State health departments and Federal water development agencies in a "conservation irrigation" program to control insects of public health significance associated with the development of national water resources. Application of the principle of "conservation irrigation," a concept of the Soil Conservation Service, can greatly reduce the hazard of mosquito-borne disease.

Irrigation, which has opened some 22 million acres of arid and semiarid land to the production of food, often results in the breeding of mosquitoes and the spreading of the diseases they carry. Studies made in the past have shown that as many as 20,000,000 eggs of one type of mosquito may be present on a single acre of irrigated pasture, and a new brood may be produced following each flooding of the area throughout the irrigation season.

Nutritional Problems and Civil Defense

By Sir JACK DRUMMOND, D.Sc.

The foundation of any scientific plan for feeding a civilian population in time of war must be estimates of man's daily need, under various conditions, for essential nutrients. I well recall the anxiety with which we searched the literature in 1939 in order to compile a list of such requirements and the trepidation with which we applied them to calculations of food supplies. In times of peace, scientists can amiably disagree over the need for ascorbic acid without arousing any fears, but the difference between 10 mg. and 50 mg. a day represents a formidable quantity of the vitamin itself or of foods rich in it when the population factor of 44 million has to be applied in times of rigid economy.

You will all recognize how insecure was the foundation of our 1939 calculations by comparison with that now provided by the experimental and practical experience gained during and since the end of the war. There are disagreements between the findings of the two expert bodies that have reported recently. The National Research Council and the British Medical Association do not see eye to eye on every assessment, but the differences are negligible when set against the important fact that there is full agreement on energy requirements.

None of the many lessons we were taught by practical experience during the last war approaches in importance the outstanding demonstration in Western Europe that the provision of energy dominates the nutritional picture. That is not to say that the importance of calories was underestimated. Calories were given much attention, but qualities of food other than their equivalence of energy occupied our thoughts to an extent that now appears to have been unnecessary. It is easy to be wise after an event, so I have no hesitation in expressing the view that the outstanding problem facing those who will be responsible for feeding the civilian population, should another war burst upon us, is to find ways and means of providing the daily energy requirements of the people in the form of palatable and acceptable foods.

Calorie Deficiency Most Harmful

Time and time again during the war years striking illustrations were recorded of the harmful effects of calorie deficiency on working capacity, physical condition, and morale. By contrast, examples of ill health caused by protein deficiency or shortage of vitamins were distinguished by their rarity. I am referring, of course, to conditions in Western Europe, not to those that prevailed in the Far East. I imagine, however, you have in mind, in studying your own problems, conditions comparable with those that we in Great Britain experienced and that affected also France, Belgium, Holland, and other adjacent countries. With such foods as inevitably form the basic diet under these conditions there is small risk of any nutritional disorder arising.

To justify this statement let me give you two examples. During the worst period of the war,

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The late Sir Jack Drummond was the scientific adviser to the Ministry of Food of the United Kingdom, 1939–46. His was the opening paper of the scientific section of the combined conference at Church House, Westminster, December 3, 1951 (see Public Health Reports, July 1952, p. 607).

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the winter of 1940–41, when the food supply situation was truly alarming and when civilian morale was being sternly tested by heavy bombing, we, at the Ministry of Food, were under considerable pressure to distribute vitamin preparations to stave off nutritional disaster and boost morale. Our calculations indicated that the food of the people, restricted as it was, provided a sufficiency of all essential nutrients. On that conclusion we stood firm and declined a generous offer to provide what would have been needed to make a nation-wide distribution. A decision that was then taken on what was admittedly rather shaky scientific evidence was amply justified later. A glance at the record of the years 1940–49 recently published by the Ministry of Food (The Urban Working-Class Household Diet, H. M. Stationery Office, 1951) makes that clear.

My second example also concerns vitamins. When representatives of the Allied powers were planning in 1943 the relief of the populations of occupied Western Europe, there was again a loud and insistent demand that huge quantities of vitamin preparations of one kind or another be included in the supplies of food to be brought up in the wake of the liberating armies. Intelligence reports had given a grim picture of the widespread incidence of malnutrition among the populations of the large towns and had laid stress on the need for vitamins. Disregarding these reports (intelligence reports concerning what the townspeople were actually eating, as distinct from what they were able to obtain as rations, were disconcertingly misleading), we based a decision on the common-sense reasoning that as rations of staple foods decrease people strive to eke them out with whatever else they can acquire by hook or by crook. Vegetables usually make up a large part of what can be so obtained, and these, together with the increased extraction of cereal flour that is an inevitable consequence of food shortage, tend to raise the general level of vitamin intake. Again, the decision was fully justified when the condition of the urban populations was examined on liberation. Apart from rare cases, appropriate for medical rather than nutritional treatment, the picture in every town of Western Europe was the simple one of deficiency in calories.

Starling coined in 1915 the aphorism "take care of the calories and the proteins will take care of themselves." Had he been dealing with the food situation in 1939–45, he would have been tempted to link with the proteins all other essential nutrients, for it is certainly true that the shift of balance of foods which wartime restrictions nearly always impose tends to raise the intake of vitamins and of important mineral elements. Under the conditions of emergency that form the background to the study of civil defense the problems of food supply become considerably simplified if this argument is accepted. I firmly believe that the history of the last war provides a wealth of evidence to justify its acceptance.

Need 2,900 Calories a Day

I see the major civil defense nutrition problem to be the provision of enough food for all to satisfy hunger, bearing in mind that hunger is closely attuned to energy needs. In round figures that represents 2,900 calories per head per day in the form of supplies to the family. It is a curious fact that this figure applies to a wide variety of conditions of life. It is not greatly influenced by the proportion of the population engaged in heavy physical work nor by different food habits. It is changed substantially only when there is a high proportion of children in the population, as, for instance, in Italy and Eastern Europe.

An energy provision equivalent to 2,900 calories per day per head will not only enable a population to undertake physically all the tasks a grave emergency will present, but with equitable distribution of foods such as were available in Great Britain during 1939–45, it can be made to cover all nutritional requirements without recourse to artificial supplementation of the diet. That, I submit, is a fact of immense practical importance too often obscured by academic discussion of what are, in fact, much less vital problems.

The question of palatability is of no less importance than that concerning calorie supply. Hundreds of striking examples can be drawn from wartime experience to demonstrate how carefully devised nutritional plans can be wrecked by disregarding people's likes and dis-

likes. The half-starved people of Malta threw dried eggs into the street rather than eat an unfamiliar food; rice-eating Hindus in the great famine died before they would touch the millet which relief brought; our troops wore themselves to skin and bone in the Burmese jungle rather than endure the monotony of living exclusively on the famous K ration, one of the most scientifically compounded of all the wartime rations. These facts must not be ignored now that we are again taking stock of the situation. On the contrary, they must color our every thought on emergency feeding. We found by experience in Great Britain that people shaken by bombing don't relish a bowl of hot soup and biscuits. They want a cup of hot, strong tea! It would, I imagine, be coffee if American cities were attacked. Give urgent and serious attention to such problems; their solution will be half the battle won!

Returning now to the all-important calories, consideration must be given to the contingency, a very probable one, that the full provision equivalent to 2,900 calories per head per day cannot be achieved. Any substantial reduction below this figure means either that all go short or that selected groups (e. g., heavy workers, children) have priorities that further reduce the shares of the less fortunate. With the arguments for and against selective rationing I am not here concerned. The whole question is fraught with difficulties and can only be rationally approached in the light of the special circumstances prevailing at the particular place and time. But, however the distribution may be made somebody will have to go short and that somebody will suffer.

Effects of Calorie Deficiency

One deep impression made by the experience during the war is that deficiency of energy intake is associated with signs of a very characteristic nature, signs more immediately recognizable than any of those associated with lack of vitamins or protein about which so much has been written. From the practical standpoint the consequences of energy deficiency are vastly more important than those of any other shortage. They affect morale surprisingly quickly. Discontent, grumbling, and irritability are characteristic signs associated with a reduction in calorie intake of the order of 20 percent, particularly when it affects those engaged in physical work. The loss of weight related closely to the negative calorie balance is of less importance than the disturbances of mental balance. The picture presented by the underfed victims of the war coincides exactly with that drawn by Dr. Ancel Keys from the close study of his volunteers. It is a picture that calls for the closest study by all who are concerned with food plans to meet a new emergency.

As the food supply is reduced below that required to provide the requisite 2,900 calories per head per day there are two clearly marked levels which can be called critical. The first can be placed at about 2,000 calories. Down to this point it is not difficult to devise differential rationing systems which will enable all groups of the population to get along tolerably well for a considerable time. The output of work will not be optimal and there will be other signs of energy deficiency apparent, but in general the picture will not be disturbing. But below this level the task of allotting the available food will become more and more discouraging until a point is reached at about the level of 1,500 calories at which it is quite impracticable to do more than plan for survival unless part of the population is deliberately subjected to starvation in order to enable the remainder to work, as was done in Leningrad during the seige. I am referring, of course, to periods of more than a few weeks.

In summary, my views on the problem seen in its broad perspective can be condensed into two simple conclusions:

1. In the first place attention should be concentrated primarily on the provision of energy. Apart from the special case of mothers and young children, other nutritional requirements are of quite secondary importance.

2. The palatability and acceptability of the foods to be distributed are qualities of the very highest importance. It is of far greater moment to give people in an emergency food they will wish to eat than to offer them something that is nutritious but unappetizing.

Food Supply and Emergency Feeding In Civil Defense

By PAUL B. MURPHY, LEONARD R. TRAINER, B.S., and JAMES M. HUNDLEY, M.D.

The need for feeding the homeless and injured as soon as possible after a disaster has been demonstrated repeatedly. Emergency feeding is important not only to maintain the nourishment of the affected individuals, but it is essential for morale purposes. The experience of Great Britain during World War II demonstrated that a hot drink and a warm meal immediately after a disaster often marked the point at which individuals began to pull themselves together.

A community which can organize mass feeding within several hours after a disaster vividly demonstrates that it is still functioning, and this demonstration tends to allay anxiety and panic. Of equal importance in maintaining morale and in allaying public anxiety is the resumption of normal food wholesaling and retailing at the earliest possible moment. Finding food in the shops where the public is accustomed to seek it constitutes a major step in the return to "normalcy" and additional evidence that the community is functioning and will survive the disaster. Furthermore, this enables those who can remain in their homes to procure food and thus relieve the burden on public feeding facilities.

Disasters from natural causes are not strangers in the United States. Many organizations, especially the Red Cross, have had extensive experience with this type of problem. However, man-made disasters, which atomic weapons could produce, pose problems of a magnitude and complexity not experienced in this country. Should one or more of our major cities be subjected to atomic attack or to intensive conventional bombing, the resources of large sections or regions might have to be mobilized. A nationally integrated plan is necessary.

The Federal Civil Defense Administration (FCDA) has developed plans and recommended organizational patterns which can be adopted with reasonable uniformity in all parts of the Nation and which should result in the activation of State and local units capable of meeting any anticipated situation when functioning singly or collectively.

Food Supply

The National Level

It is evident that after attack the requisite supplies of food should be available whenever

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Mr. Murphy is food consultant for the Federal Civil Defense Administration and was chairman of the United States delegation to the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense, London, November 26–December 13, 1951 (see Public Health Reports, July 1952, p. 607). Mr. Trainer is director of the food distribution branch, Production and Marketing Administration, Department of Agriculture. Dr. Hundley is consultant on nutrition for the Federal Civil Defense Administration.

This paper is based on material presented at the London conference. A second paper, by Dr. Hundley, which follows on page 864, outlines the primary characteristics of emergency food reserves.

and wherever needed for mass feeding and for home consumption. The basic plan calls for necessary food supplies to be available in normal commercial channels rather than in special stockpiles or reserves. Two Federal agencies—FCDA and the Department of Agriculture (USDA)—share primary responsibility at the national level. Both agencies with full recognition of the interdependence of their respective responsibilities have developed a joint plan for emergency feeding.

The Department of Agriculture has the basic responsibility for the Nation's food supply and for securing maximum food production to meet all needs, including emergency feeding. Further, USDA is responsible for directing food distribution—except actual rationing—so that necessary supplies will be available. USDA has the responsibility of instituting cooperative programs with the food industry and with food wholesalers and retailers to assure that the system of commercial food distribution carries sufficient food inventories to meet both current consumption and emergency food needs. In an actual emergency, USDA will effect any regional or national redirection of food distribution which may be requested by the Federal Civil Defense Administration to assure delivery of food supplies to damaged cities and to reception and evacuation areas as soon as possible after attack, or to areas affected by civil defense operations. USDA also is responsible for assuring adequate food supplies during reconstruction and rehabilitation pending the reestablishment of normal food distribution channels.

Federal Civil Defense Administration works closely with USDA in implementing the above plans and in obtaining the voluntary cooperation of the entire food industry on a nationwide basis. The fullest cooperation of the food industry and the food trade is essential at national, State, and local levels if the plans outlined are to function effectively.

Federal Civil Defense Administration has the further responsibility for perfecting and sponsoring operational plans which will translate the national plan into effective functioning programs at the State and local levels. FCDA Policy Memorandum No. 10 and FCDA Advisory Bulletin No. 78 have been distributed to all State and major local civil defense units. They describe in detail the State and local plans recommended.

Leadership in the State

FCDA recommends that, at the State level, the governor or the civil defense director appoint a civil defense food director who is thoroughly familiar with the food industries in the State. In most instances, the food director should be a volunteer from leaders within the food industries of the State. The food director would serve as chairman of the State food advisory committee which would include one member selected from the membership of each local food advisory committee.

Leadership Channels for Emergency Feeding

NATIONAL . . .	Federal Civil Defense Administration Department of Agriculture
STATE	Governor and Civil Defense Director Civil Defense Food Director—Chairman of Food Advisory Committee Food Advisory Committee—1 member from each local food advisory committee
LOCAL	Civil defense directors in major trade centers Civil defense food advisory committees Directors of emergency feeding in civil defense units Department of Agriculture consultants Representatives of local food industries Caterers and restaurateurs Volunteer workers

The State civil defense food advisory committee should perfect, with civil defense supply and transportation divisions cooperating, plans to procure and transport necessary food. A uniform plan of voluntary controls covering the

sale of food for the entire State should be developed in the event of attack.

Local Leadership

A local civil defense food supply advisory committee should be appointed by the local civil defense director in each major jobbing center in the State. The area supervisors of the food distribution branch, Production and Marketing Administration, USDA, are available for consultation in choosing the centers. The local committee should include local representatives of all the important fields of the food industry.

The local food committee functions the same as the State committee but is limited to respective local areas. In addition, the committee must establish a working relationship with local leaders in charge of emergency feeding. Estimates of the food requirements for feeding the homeless, for feeding in hospitals, and for feeding essential civil defense workers and other groups must be obtained so that the food committee can determine the magnitude of its task in light of available resources.

Precise definitions of responsibility must exist among the various local divisions of civil defense assigned to activities related to emergency feeding. The local units must have a clear channel to their respective State and regional organizations, and they, in turn, to their national organization.

Emergency Feeding

Advance planning is essential. Each local civil defense unit must develop an organization capable of preparing and serving meals on a mass basis with limited facilities. Normal water supplies may be unavailable. Public utilities will undoubtedly be disrupted. Electricity and gas for cooking may be unavailable. Plans must be considered for using alternative cooking fuels—bottled gas, solid fuels, or emergency generators—and for cooking with improvised equipment. Thousands of meals may have to be served under primitive conditions and with only a few hours' notice.

A director of emergency feeding must be appointed in each local civil defense unit. The existing facilities for the mass preparation of food must be surveyed. Sites must be selected for feeding the homeless, the injured, and evacuated groups. The selection must be done in consultation with local leaders who are responsible for medical services and for other civil defense divisions. Plans must be made to feed essential civil defense workers engaged in fire fighting, rescue work, and repair of public utilities. Because workers may have to be fed where they are working, the transportation of prepared food will be another problem.

The facilities of caterers and restaurateurs should be fully utilized. Arrangements should be formalized with these groups so that they can secure food and go into action with a minimum of delay when authorized to do so by competent authority.

The importance of advance planning and organization for emergency feeding cannot be overemphasized. It is obvious that the best food supply arrangements will be useless if personnel and facilities are not available to transform the raw food supplies into nourishing, acceptable meals. It is also obvious that many workers will have to be available and trained.

Recruitment and Training

Groups of volunteers must be recruited, organized into teams, trained, and assigned to the selected feeding centers. The experience and "know how" of dietitians, nutritionists, home economists, commercial chefs, as well as church groups, and such public feeding groups as school lunchroom personnel, should be utilized in training activities. The existence of experienced local Red Cross units in many areas constitutes a valuable resource not to be overlooked.

Coordination of Activities

The activities of the emergency feeding group must be coordinated with other aspects of mass care—clothing, shelter, and evacuation.

It is especially important to establish a sound working relationship between the emergency feeding program and health services. The responsibility for feeding in temporary hospitals and in first-aid stations, for the training of the necessary workers to prepare and distribute the

food, and for provision of the required quantities of food must be clearly understood. Any special foods or abnormal quantities of specific food items which will be required by the medical services should be known in advance in order to arrange necessary procurement.

The sanitation services also have important functions in emergency feeding not only with respect to food sanitation but also to safe water supply, garbage disposal, and to the special problems posed by atomic, biological, or chemical warfare.

International Rheumatic Fever Study

An international cooperative study of rheumatic fever, the first of its kind, has been under way since early 1951 at 13 research centers in the United States, Great Britain, and Canada. Scientific investigators of the three nations are measuring the comparative values of treating rheumatic fever with one of the hormones—ACTH or cortisone—or with salicylates. Although the acute symptoms of rheumatic fever usually subside with all three agents, no clear difference has as yet been established in the rate of completeness of this improvement, according to the preliminary report of a panel of investigators.

A summary statement of the findings in the preliminary report was presented in June to a joint scientific session of the Council on Rheumatic Fever and the American Rheumatism Association in Chicago. The text follows:

"A group of investigators in the United Kingdom, Canada, and the United States initiated in January 1951 a cooperative study on the relative value of ACTH, cortisone, and salicylates in the treatment of rheumatic fever and the prevention of rheumatic heart disease. The plan of study provides for uniform criteria for the diagnosis of rheumatic fever and for the degree of rheumatic activity required for the admission to the study, the random allocation of patients to the three treatment groups, a defined dosage schedule of the drugs for a fixed period of time, a specified period of observation following treatment, and a long-term follow-up schedule. It also lays down precisely the frequency and type of clinical and laboratory observations to be carried out on each patient.

"To date, in all three countries, 658 cases have been admitted to the study, and the analysis of rather less than half of these is the basis of the preliminary report. These cases were analyzed for changes in those symptoms, signs, and laboratory observations usually considered important in evaluating the course of acute rheumatic fever. In the type of cases admitted to the trial and with the regimen of treatment laid down, it appears that individual symptoms, signs, or laboratory observations may have been affected more favorably by one or another of these three drugs, but no consistent pattern is evident. In short, no firm conclusions can at present be drawn concerning the drug most effective in the control of the acute illness. The cases have not been under observation sufficiently long to provide data on the prevention of rheumatic heart disease.

"Admission of new cases to the study will be brought to an end later this year. It is anticipated that a total of 750 cases will be available in all three countries for complete and detailed analysis of the effects of the drugs on the acute course of the disease and later, after adequate follow-up, on the prevention of rheumatic heart disease."

Funds for the international study are being supplied by governmental and voluntary health agencies in the three nations and include the National Heart Institute of the Public Health Service, Federal Security Agency.

Necessary Foods for Emergency Feeding

By JAMES M. HUNDLEY, M.D.

The joint policy of the Federal Civil Defense Administration (FCDA) and the Department of Agriculture (USDA) provides that foods for emergency feeding shall be made available from existing commercial stocks and through normal distribution channels. To accomplish this, the food industry and food transportation facilities would be organized nationally and locally to deliver needed foods to emergency areas. The FCDA-USDA plan for emergency feeding poses problems which are primarily administrative. It does not present any immediate problems from the standpoint of nutrition or food technology.

This emergency feeding plan does not preclude the FCDA-recommended practice that all families with infants under 1 year, and families in critical target areas especially, should maintain in their homes—at all times—a rotating 1-week supply of canned evaporated or similar acceptable milk product, necessary cereals, and other special foods for infants. It does not preclude the desirable, and normal, practice in most families of maintaining a rotating pantry supply of food sufficient for 3 or 4 days.

Nor do the joint-planning agencies—FCDA and USDA—visualize the establishment of any special food stockpiles to be held in readiness for emergency use. Proper organization of food and transportation industries would make stockpiling unnecessary—at least under prevailing conditions. However, it is possible to visualize situations and to anticipate developments which might make it imperative to supplement the existing plan by establishing special stocks of food.

Therefore, it is important to examine and classify the technical information which would govern the establishment and management of food stockpiles, to define areas in which our knowledge is deficient, and to list the foods and food products which are suitable for this purpose. This information should be developed in a form which can be utilized on short notice.

What plans have been considered for providing reserve stocks of food under emergency situations?

Family Food Stocks

In time of emergency, the practice of maintaining a rotating family food shelf should be officially encouraged as much as may be consistent with national food supplies and with due concern for the prevention of hoarding. No technological problems are posed by the family food shelf plan since the foods would be staple products normally procured and used, they would be rotated frequently, and their characteristics are well known to every housewife. Goodhart and Jolliffe (*1*) have suggested food items which should be included in this family food shelf.

A family food package might be designed as a special packaged ration—or group of pack-

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This paper was presented, in outline, before the scientific section of the London Food Conference on December 3, 1951 (see Public Health Reports, July 1952, page 607).

aged foods—for a day's supply sufficient for a family of four. It could be set aside as a permanent reserve and stored in basement and shelter areas. Existing special packaged rations such as those used by the armed forces should be considered.

The desirable characteristics of a family food ration are listed:

1. The food products must be stable for at least 1 year under storage conditions of temperatures fluctuating from 0° to 95° F., and of relative humidity fluctuating from 10 to 90 percent.

2. The foods should be chosen for their general acceptability, for retention of their essential flavor and odor, and for other desirable characteristics under storage conditions.

3. The foods should be well-known types of food which the average housewife can use without detailed instructions.

4. At least a part, and preferably all, of the foods should not require cooking or heating.

5. None of the foods should provoke thirst, and they should require a minimum of water for preparation.

6. The ration should include fruit or vegetable juices to supply fluids when water may not be available.

7. The ration should supply about 2,000 calories per person per day. Detailed consideration of the vitamin, mineral, and protein content is not necessary, but the maximum utilization of natural food products is desirable.

8. All foods should be packaged in dustproof, closed containers which can be rinsed externally with water, if necessary. Packaging materials should utilize noncritical items to the maximum possible extent.

9. The size, weight, and type of food package should be standardized for easy handling and efficient storage.

10. The foods selected should be items likely to be in good supply, even under conditions of nationally restricted food supplies.

11. The cost should be low.

Warehoused Food Stockpiles

Arrangements could be made for food wholesalers, jobbers, and distributors in suitable locations to increase their normal inventories of specified food commodities to an extent that would partly or completely meet anticipated needs for emergency use. Since the food commodities specified would be those normally in commercial channels, and since the increased inventories of the wholesalers could rotate at fairly normal rates, problems of storage deterioration are avoided.

Inactive stores of food could be established in selected locations to be held for time of need. Special food stockpiles for civil defense use might contain individual units or family packaged rations in addition to bulk supplies for mass feeding operations.

The 11 recommendations listed for planning a family food ration also apply to inactive warehouse food supplies. However, under the first item mentioned—stability of foods—a storage life of more than one year is recommended. This can be achieved, in part, by more rigid control of storage conditions.

In the stockpiling of food for mass feeding operations, special consideration must be given to food items which require a minimum of preparation and which can be served easily and rapidly on a mass basis. Disorganization and confusion inevitably result in the first hours of an emergency. The simpler the plan for emergency feeding, the more easily it can be organized and put into prompt operation during these critical hours. Normal power and fuel may temporarily be unavailable, and water supplies may be limited.

The establishment of special inactive stockpiles of food offers the greatest challenge to nutritionists and technologists. In many instances, food items which would be desirable for stockpiling are not commercially produced in a form having optimal stability and acceptability characteristics. A more detailed assessment of the technological adequacy of currently available food items for stockpiling is being published (*2*).

Dehydrated fruits and vegetables, skim or whole dried milk powder, canned evaporated milk, dried eggs, certain types of canned meats, dried soup powder, canned fats, spreads, flour, sugar, cereals, fruit juices, and beverage products are types of food items which currently seem to offer the most promise for stockpiling purposes.

A careful plan would have to be devised for the management of any stockpiles of food to provide for periodic checking and rotating to prevent spoilage and waste. Storage bulk, ease of handling, and protection against rodents and insects should not be overlooked in planning stockpiles for mass feeding.

Special Feeding Problems

Lactating women, in particular, and infants under 1 year have nutritional needs which demand special consideration in the planning of food supplies (see Heseltine, page 872). Individuals with severe burns, fractures, and other major trauma require special nutritional treatment if maximum chances for recovery and speedy convalescence are to be assured (*3*). Dried eggs, dried whole or skim milk, crude casein, and dehydrated soups offer special promise as products which could be stocked as part of the general ration and which could be made available in medical facilities to meet the special feeding requirements of the ill and the injured.

Special nutritional supplements—vitamin and mineral enriched food bars, wheat germ, brewer's yeast, tablets and capsules—are not required for civil defense emergency feeding of the homeless. Such products are, however, essential in certain types of major illness or injury. This need can be met by stocking the food supplements as part of medical supplies rather than in general food stocks.

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New Sewage Projects

More than 2 million people will receive the benefits of new and improved service upon completion of 111 sewage treatment projects authorized during the first quarter of 1952 by municipalities in 33 States, according to figures released in June by the Public Health Service. New plants will be built in 72 instances, at a total cost of $17 million. The other 39 contracts call for additions, enlargements, or replacement of existing plants, totaling an expenditure of $10 million.

The Public Health Service cooperates in this work by developing comprehensive plans to abate water pollution and by providing research and technical assistance. The Water Pollution Control Act of 1948 authorized these services as well as financial aid in the form of grants to the States for investigations of water pollution caused by industrial wastes. The projects were developed through the cooperation of State and interstate water pollution control authorities.

Comparison with construction figures for the same months of previous years reveals that the present rate is less than the average for the years 1948–52. It meets only about one-fourth of the estimated needs arising from the growth of cities and industries.

Special Feeding Problems in an Emergency

By ROY E. BUTLER, M.D.

Much has been done to investigate the special feeding problems anticipated in a severe emergency, but much needs to be done before we are fully competent to handle them. In discussing special feeding problems, I have necessarily drawn heavily on the writings of others with more experience in these fields.

Those of us who have faced the crises of a severe emergency realize full well that previous plans are often abandoned. Instead of clockwork action, there ensues a period of frantic improvising, when available supplies and personnel are insufficient. However, plans are not wasted if they can serve as a framework for amended plans and thereby expedite a reasonable solution of the problems created by the violent disruption of normal activities. One uses what is available and hopes for the best.

Emergency Institutional Feeding

At the time of disaster, the dietary department of a hospital, and of other institutions as well, can provide prompt emergency food service to many casualties in addition to the patients, hospital staff, and volunteer workers (*1*).

It is essential that the hospital dietary department be represented on any over-all emergency planning committee for coordinating dietary activities with other hospital services. There should also be a planning committee in the dietary department, composed of dietitians and representatives of the nonprofessional hospital staff and of the volunteers.

Detailed plans for an emergency food service would include menus to be served, items to be discontinued, kitchens to be used, foods to be stocked and requisitioned, measures for protecting food from contamination, details of the food service, personnel required and their duties, training of dietary staff for specific duties, instruction on water conservation and accident prevention, preparation of designated infant formulas, and space for each function.

Emergency planning for institutional feeding should also consider the preparation of one-dish meals from customary food supplies.

A useful exercise is to inventory hospital food supplies for any one day. Its usefulness can be increased by planning menus for a 3-day period, using the average population of the hospital, then doubling or tripling that number. Such a hypothetical problem may reveal the need for a limited stockpiling of necessary foods; one example—the supply of powdered skim milk may make the difference between an adequate and an inadequate diet.

Plans for personnel staffing are perhaps the most important item, inasmuch as adequate numbers of well-trained, dependable people will mean the difference in service between efficiency and chaos. A staff of well-trained members is the result of adequate planning and instruction. The staff should be able to function under fairly primitive conditions.

In cooking outdoors over improvised stoves, can the staff maintain sanitary conditions? Will they be alert to possible contamination?

Dr. Butler, a member of the health emergency planning staff in the Office of the Surgeon General, Public Health Service, prepared this material for presentation at the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense, held in London, November 26 to December 13, 1951 (see Public Health Reports, July 1952, p. 607).

Will they be aware of practicable correctives?

Staff training under simulated emergency conditions will point up areas in which there is lack of understanding and insufficient information.

Special Disaster Diets

Nutritional considerations are included in the therapy of burns, radiation damage, fractures, shock, and other trauma under emergency conditions.

Burns

As a basis for discussing nutrition in the therapy of burns, I have turned to the "Symposium on Burns" of the National Research Council (*2*).

Malnutrition frequently develops after severe burns. Prevention efforts should be instituted early and continued throughout the healing process. A coexisting anemia is associated with burns, which may be partly connected with an improper dietary intake. The treatment of a burn should be directed toward the rapid restoration of the normal anatomical structure.

Of probable importance to an individual's recovery following thermal burns is nitrogen metabolism. Severe burns result in significant nitrogen depletion. The loss of nitrogenous compounds depends upon the degree of the burn, the extent of burn, and the presence of infection. Nitrogenous products are lost from the surface of a burn. There is also an increased urinary excretion of nonprotein nitrogen, which begins a few days after the burn, reaches a maximum in 10 days, and lasts for several weeks.

The negative potassium balance, which is observed during the first few days after the burn, may be overcome by the oral administration of potassium. No relation exists apparently between the potassium depletion and the nitrogen depletion. The former is rapidly corrected while the latter lasts several days to a week or more.

Information is much more complete for sodium potassium and chloride depletion than for the other minerals.

Changes in the carbohydrate metabolism as manifested by hyperglycemia, lactacidemia, and lowered CO_2 (carbon dioxide) combining power are frequently observed following burns. These changes may last for several days and may result from gluconeogenesis and peripheral carbohydrate breakdown.

The vitamin requirements of patients with burns and their metabolism have not received adequate study. Some studies have been made of ascorbic acid, riboflavin, thiamine, and nicotinamide with respect to urinary excretion and load tests for saturation.

The dietary requirements for burn patients seem definitely to be higher than for normal patients. The diet should be well balanced, with adequate amounts of protein, carbohydrate, fat, minerals, and vitamins. Oral feeding of burn patients is preferable, but other methods may be used such as gastric, jejunal, and parenteral feedings, alone or combined. The optimum amounts for feeding have yet to be determined.

There is some lack of agreement about the time of beginning the higher intake of food. Some believe it should be delayed a day or two. Others believe it should be started as soon as possible. However, children were maintained in good nutritional condition following severe burns when they received from the beginning an intake one and one-half times the National Research Council optimal recommendations for normal children. Men who have been given 1.5 grams of protein and 45 calories per kilogram of body weight from the start showed some nutritional depletion. However, they showed less depletion than if the food intake had been started later.

Oral intakes at high levels are well tolerated when given soon after the burn. A delay of several days may be followed by gastrointestinal upsets. In such cases, continuous gastric drip feeding may be acceptable. If the intake levels are increased to 70 calories and 2 grams of protein per kilogram of body weight, continuous gastric feeding will not be tolerated by some adult patients.

Liquid diets with a reasonably acceptable mixture of the nutrients needed are considered practical for treating burned patients over long periods. Protein is provided in liquid diets through the liberal use of milk solids. Additional quantities of carbohydrates, fat, miner-

als, water, and vitamins will make a reasonably complete food. But the possibility of urinary calculi may be aggravated by the presence of calcium and phosphorus in large quantities of milk. Peanut butter has been suggested as a source of protein with a low calcium content.

Gavage feeding through an inlying gastric tube can be used wherever it is impossible, or inadvisable, to take food orally. Feedings of this type should be frequent at first and small in quantity, with a gradual increase in amounts over several days. The gastric tube may be left in place and removed only for weekly cleaning.

The drip apparatus may be used instead of feeding the liquid mixture in intermittent doses. Because of their high solubility and tolerance, hydrolyzed protein preparations are useful in gavage feeding. Tube feedings, either through small-caliber plastic tubing or rubber Levine tubes, may be continued for as long as 3 to 5 months. A liver protein preparation may be used because of its nutritional value and its low calcium content.

Fat supplies 20 percent of the calories in both tube and oral feedings. If fat absorption is impaired or faulty, an emulsifier such as Tween 80 or a finely homogenized oil may be added to the food.

Frederick J. Stare (*2*) has conducted studies on the intravenous and oral use of fat emulsions. He believes that the body uses the fat emulsion efficiently without side reactions. Coconut oil, with most of the particles less than a half micron, is mixed with a phosphatide preparation and a polyglycerol ester of oleic acid, as a costabilizer, to form the basis of the emulsion. Glucose and some water are added to give isotonicity to the emulsion. Stare has also studied the oral use of fat emulsions for increasing the caloric intake.

Radiation

In the event of radiation injuries, the diet should be a well-balanced one, rich in minerals and vitamins. To avoid the development of intestinal ulcers, it would be advisable to reduce roughage in the diet. There is little indication that such hematopoietic agents as folic acid and vitamin B_{12} would be effective. Likewise, iron, or diets rich in iron, would seem useless until blood regeneration is observed.

Available data (*2*, *3*) suggest that individuals in good nutritional status resist radiation injury better and that morbidity and mortality rates are lower for individuals whose nutritional states are maintained at high levels after injury.

The optimum caloric intake and the proper proportion of the nutrients needed has not been determined. If the patient has combined thermal and radiation injury, oral feeding may be difficult because of the gastrointestinal upsets which follow radiation injury.

The urinary output should be maintained by an adequate intake of fluids. The acid base equilibrium can be maintained by laboratory-controlled administration of electrolytes.

A nitrogen deficit may be relieved by amino acid preparations, hydrolyzed proteins, or protein-rich foods. Restricting the sodium chloride intake may assist in preventing edema.

Fractures

In fracture cases, the patient's diet should be adequate, and its caloric content should be consistent with energy expenditures. For many years, diets to expedite the healing of fractures have been debated. Some have favored a high calcium diet because it seemed logical that a greater calcium intake would be beneficial in the presence of lesions. Others have felt that vitamin D should supplement the diet. It can be said, however, that a sufficient amount of calcium or vitamin D is commonly supplied by adequate diets and sunshine. Nor is it thought that a fracture gives rise to increased requirements. Undoubtedly, there are other dietary factors given especial powers by some physicians. Malunion or un-united fractures are sometimes attributed to a faulty diet. Far more frequently, however, the fault lies in the failure to hold bone fragments in alinement.

The immobilization of a limb, or of an individual, may produce physiological difficulties. A leg or arm immobilized in traction or plaster without proper physiotherapy will show evidence of wasting of the soft parts and decalcification of bone. In leg fractures, it was found that disability was reduced by using pins to transfix bone fragments and by placing walking calipers in the plaster cast to permit free movement. When the fracture healed and the cast

was removed, the leg was found to be in better condition than those legs which had been immobilized in plaster for several weeks.

Individuals immobilized for fractures of the femur, it has been observed, are soon found to be in negative nitrogen balance. This condition apparently has no adverse effect on the healing of the fracture, but it may contribute to the weakness and debility which follow the inactivity attendant upon healing. That the negative balance can be changed to a positive nitrogen balance by sufficiently increasing the protein intake is a matter undergoing intensive study.

Shock

Shock is usually treated as a surgical or medical problem in which the therapeutic measures are well established. In an acute emergency there may be, however, shortages of blood, plasma or blood expanders, intravenous sets, and facilities for their use. The Public Health Service has found the oral administration of a salt solution to be of value in treating shock. A simple remedy, the solution uses familiar and readily available compounds: 1 level teaspoonful salt; one-half teaspoonful soda, and 1 quart water. Still the subject of study, and not a substitute for blood, the simple salt solution may temporarily tide an individual over until a transfusion can be given.

The National Research Council subcommittee on shock has recommended the manufacture of dextran as a blood expander in the treatment of shock. Dextran is thought to be well metabolized in the body and can be administered with relatively few side reactions. Other promising substances are under investigation.

Therapeutic Diets

Peptic Ulcer Patients

A regimen of frequent feedings of milk and cream for peptic ulcer patients would not be possible during the disruption of war. For their treatment these patients would find it necessary to depend upon antacids and coating substances. The danger of hemorrhage would not increase much with this course of action. Obviously, surgery should be reserved only for extreme cases.

Many ulcer patients, if not seriously ill, would want to assist in civil defense. They would be expected to eat whatever food was available. The enthusiasm of some ulcer patients for their civil defense duties might even lead to the complete disappearance of the ulcer symptoms.

Diabetic Patients

According to estimates, there are about one million known diabetic patients in the United States (*4*). As many again are believed to be undiscovered or not under medical care. About 70 percent of the known patients are taking insulin daily, a percentage which would undoubtedly be increased in an emergency: burns and other injuries would increase insulin requirements.

Patients who control their diabetic condition can serve usefully in civil defense or in industry. Complete understanding of their own disease and its treatment is their best safeguard.

For prompt recognition in an emergency, a diabetic patient should carry proper identification. To protect himself, he should also have a reserve stock of insulin sufficient to last a month or two, a simple test kit for glycosuria, and an extra insulin syringe and needles.

The education of the diabetic patient should be directed to the end that each one will be fully aware of the measures he must take before any emergency arises. He should know how to control his diabetes by diet alone if insulin is not available. Personnel with the task of feeding evacuees and casualties should receive rudimentary instructions on diets for diabetic patients. Such training applies more to personnel in emergency hospitals than to those in general hospitals where personnel and facilities for the proper handling of diabetes are likely to be present.

All diabetic diets should be nutritionally adequate. The diet most commonly used by physicians is one with protein (1 gram per kilogram), carbohydrate from 120 to 250 grams, and fat contributing 40 to 55 percent of the calories. In this diet protein meets all requirements. A pint of milk supplies the necessary calcium. Vitamin requirements are met without difficulty.

Another commonly used diet has fat supplying 20 to 25 percent of the calories; carbohydrate, 60 percent. With a diet supplying be-

tween 1,600 and 2,400 calories, the carbohydrate intake would amount to 240 to 380 grams a day.

There is a third type of diet which does not differ from a normal diet, where fat would contribute 35 percent, and carbohydrates, 50 percent of the calories.

Tuberculous Patients

In an emergency, the rich diet of the tuberculous patient must necessarily be restricted. During normal times, his diet would be high in calories and well balanced as to mineral and vitamin content, with emphasis on the protein component. Only an approximation of this diet may be available in an emergency, and the degree attained will depend on the food stocks at hand. Supplemental vitamins and minerals may bolster a diet otherwise lacking in these factors. For short-term emergencies, moderate to severe deprivation probably will not result in irreparable damage. Patients with fever will have an increased metabolism which will accentuate the need for additional food.

Conclusion

In general, I am in agreement with the philosophy of the Federal Civil Defense Administration as expressed in the manual on "Health Services and Special Weapons Defense" (*5*).

The Federal Civil Defense Administration recognizes that special therapeutic menus need not be provided immediately after a major disaster. For experienced nutritionists and dietitians to be assigned at such a time to the procurement of special foods would be impracticable. Conditions for which special diets are usually prescribed could be controlled temporarily with drugs and medicines until an orderly flow of food supplies is re-established.

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New Chief of Division of Dental Public Health

Dr. Thomas L. Hagan was appointed chief of the Public Health Service's Division of Dental Public Health in June 1952. He succeeds Dr. John W. Knutson, who was named chief dental officer of the Public Health Service.

Entering the Public Health Service in 1929, Dr. Hagan became a member of the commissioned corps in 1930. He has served as dental clinician in Public Health Service hospitals in Boston, New York, Pittsburgh, and Louisville, as dental consultant in regional offices in New Orleans and Atlanta, and since 1950, as assistant chief of the Division of Dental Public Health and dental consultant for Federal Security Agency Region III.

Dr. Hagan graduated from the Georgetown University Dental School and obtained a master's degree in public health at the University of Michigan.

Feeding of Mothers and Children Under Emergency Conditions

By MARJORIE M. HESELTINE, M.A.

Infants, children, and pregnant and lactating women, even though healthy and uninjured, are generally conceded to need special consideration under emergency conditions. They have heightened nutritional needs that cannot be met in full from the food allowance for the "normal consumer." Failure to meet these needs may have lasting consequences for the human resources of the Nation. Provision for dependents sustains the morale of heads of families who are working in essential industries and in civil defense.

Although the special problems associated with feeding these groups vary with the intensity and duration of the emergency, any plan for providing food under conditions of stress should meet at least three criteria.

Hunger must be allayed and physiological needs for maintenance of health and for normal growth should be met. The essential nutrients must be provided in a form and under conditions that avoid any danger to health through contamination, whether bacteriological, chemical, or radiological. Both the foods and conditions of feeding should help to minimize psychological trauma associated with the disaster and, insofar as possible, should contribute to a sense of security.

These criteria shift in relative importance according to the specific age group in question and the severity and duration of the emergency.

Since the emphasis in civil defense food planning in the United States has been on an emergency period of less than 30 days, the problems associated with special groups for that period are given chief consideration in this discussion with but brief reference to a more prolonged state of abnormal food supplies and facilities. We have thought of this emergency as affecting a population which in the main has had enough food and consequently is in reasonably good nutritional condition. We have also assumed the existence of sufficient supplies of food to meet minimal emergency needs of normal consumers plus enough processed foods to supplement the diet of vulnerable groups for the immediate postdisaster period. A third assumption is that civilian food rationing is not in effect at the outset of the emergency.

Meeting Physiological Needs

The recommended dietary allowances of the National Research Council that apply to mothers and children provide the objective toward which emergency food plans should strive. Insofar as possible the needs for energy, protein, and thiamine of such especially vulnerable groups as children under 2 years and lactating women should be met even during short periods of emergency feeding. The recommended allowances of these nutrients amount to:

Miss Heseltine is chief of the nutrition section in the Division of Health Services, Children's Bureau, Social Security Administration. *Her paper is based on material presented before the Combined Conferences on Administrative and Scientific Aspects of Food in Civil Defense held in London last winter (see Public Health Reports, July 1952, p. 607).*

Group	Calories	Protein (gm.)	Thiamine (mg.)
Infants under 1 year	800	25	0. 4
Children 1 to 2 years	1, 200	40	. 6
Lactating women	3, 000	100	1. 5

If these essential nutrients are eaten in the form of such foods as milk, bread, and potatoes, other vitamins and minerals will also be supplied in quantities that, added to those stored in the tissues of well-nourished individuals, will meet minimal requirements for a few days or even weeks.

Priorities Among Mothers and Children

During an acute emergency when it may be impossible to make special provision for all mothers and children, it is recommended that the first to receive attention be infants under 2 years of age and lactating women. For periods of less than a week, healthy and previously well-fed children over 2 and pregnant women should not suffer by subsisting on the food made available to the general population. For emergencies of more than a week, it is hoped that children between the ages of 2 and 6 years and women during the last half of pregnancy can be added to the groups receiving supplementary foods. During periods of prolonged food shortage, it is highly desirable that children of school age be added to the groups for which supplementary foods are provided, probably through meals served at school or in child care institutions. Although the special nutritional requirements of adolescents are recognized, it does not seem feasible to make special provision for them unless they are attending school or are engaged in an essential industry or civil defense work. Under these circumstances they can be supplied with at least one meal in addition to those eaten with the family.

Water and Milk

Water is the most essential of all nutrients, especially for infants. Pediatricians estimate that the daily allowance, including water used in the milk formula and in the cooking of cereal porridges, should be approximately 1 quart per day. An equal quantity of water as such or in beverages should meet the minimal needs of older children for drinking except in very hot or dry climatic conditions. The infant's need for water as such is obviously made more acute by the general reliance on concentrated milks for infant formulas in the absence of ample safe supplies of fresh fluid milk. Provision of uncontaminated water therefore takes a top priority in child feeding programs. The household emergency shelf should provide ample supplies of potable water for dilution of the infant's milk mixture. If water is temporarily unavailable, other suitable fluids, such as bottled fruit beverages and mineral water, might be used in the formula.

A suitable source of energy to allay hunger and support activity and growth ranks next in importance to water. For infants under 2 years of age this means whole milk supplemented chiefly by cereals. The form of milk suggested for emergency child feeding in urban areas of the United States is evaporated (unsweetened condensed) milk, available in cans containing the equivalent of slightly less than 1 quart of fresh fluid milk. Practically all evaporated milk is fortified with vitamin D (chiefly in the form of 7-dehydrocholesterol) in the concentration of 400 international units to the reconstituted quart. Because this milk is widely used in infant feeding under normal conditions, it is a familiar and acceptable food. A daily allowance of one 14½-ounce can per child under 2 will allow for inevitable losses in preparation and for rejection of individual feedings by young infants. It will also compensate in part for shortages in other foods that are normally consumed by children from 1 to 2. If supplies of whole milk are not sufficient to provide the equivalent of 1 quart to all children under 2, infants under 6 months of age and nursing mothers should be taken care of first. Whatever is left could be prorated among the group between 6 months and 2 years.

As British experience in World War II has demonstrated convincingly, another form of milk that is satisfactory for emergency feeding, when safe water and facilities for reconstitution are available, is spray-dried whole milk. Preference should be given to those brands that are fortified with vitamin D. Four and one-half ounces of dried whole milk represent the solids in 1 quart of fresh whole milk.

Sugar is commonly added to infant formulas

of diluted whole milk as a supplementary source of energy. If uncontaminated sugar is not available, an equal quantity of a less dilute milk mixture will meet energy needs without causing digestive disturbances, provided that the milk has been modified by heat, as is evaporated milk, so that a finely divided curd is formed in the stomach. The baby, however, may indicate some displeasure at the absence of the familiar sweet taste in his feedings.

The usual practice of warming milk to body temperature before giving it to the infant may have to be abandoned in an emergency. Fortunately, there seems to be no evidence that bacteriologically safe unwarmed milk will cause digestive upsets.

In short, numerous adaptations to abnormal conditions can be made in providing milk without sacrifice of the infant's nutritional well-being.

For children over 2 and for pregnant and nursing mothers, skim milk can be used for part or all of their milk supply. The most readily available form of skim milk in American cities, nonfat dry milk solids, is well suited for emergency feeding if there is sufficient safe water and the necessary equipment for reconstituting the milk.

Other Foods

Cereal products will constitute the principal source of energy for mothers and older children and a supplementary source for infants. The cereal foods that are manufactured especially for babies, fortified as they are with minerals and vitamins and requiring only the addition of milk or water to make them ready to serve, are well suited for emergency conditions. Bread, which will probably be the main source of energy for the population as a whole, can be soaked to a suitable consistency for even very young children. When bread must constitute such a large part of the ration, it is important that it be of superior nutritive value—made of whole grain or enriched flour and containing a significant proportion of milk solids.

Other foods that are commonly given to children to supply vitamins, minerals, and additional protein and energy can be dispensed with in emergency feeding of not more than 1 month's duration. However, if supplies should be readily available, they will contribute appreciably to the nutritive value of the diet and to the peace of mind of mothers and children. American children under 2 normally consume large quantities of canned foods packed especially for their age—sieved or chopped fruits, vegetables, meat, and soup mixtures. These foods, which are packed in cans ranging from 3½ to 5 or more ounces and are reasonably acceptable to the young palate even without the customary warming, lend themselves to emergency feeding schemes as a supplement to milk and bread or cereal. For emergencies of short duration, it is not felt to be necessary to supply vitamin or mineral supplements for children under 2 or for pregnant and lactating women. Enriched bread and whole-grain or restored cereals, together with milk, will take care of most of the B vitamins and of iron. The use of fortified evaporated milk will provide protection against rickets for most infants who consume the equivalent of a quart. During a prolonged emergency, young infants who take considerably less than 1 quart of milk per day should be given 400 units of supplemental vitamin D if at all possible. For such long emergencies, it is highly desirable to provide minimal quantities of ascorbic acid (25 milligrams per day) for infants, especially those fed exclusively on milk and cereals.

During the second half of pregnancy and lactation, adequate protein to support growth of the fetus or of the young child is highly desirable although under emergency conditions it is secondary in importance to meeting energy needs. An adequate supply of energy from such natural foods as lightly milled or fortified grain products, potatoes, and dried legumes (pulses) will not only contribute substantial quantities of protein but will insure the availability for tissue-building of whatever protein is provided from these foods or from milk.

To summarize, emergency nutritional needs of infants, young children, and pregnant and lactating women would probably be met by the following daily allowances:

For an emergency of even a few days' duration

1. Infants under 6 months: 1 large can (14½ ounces) evaporated milk, or 4½ ounces dried whole milk, or 1 quart whole milk. Preference to be given to milk forti-

fied with 400 international units of vitamin D per quart.

2. Children from 6 months to 2 years: Same quantity of whole milk as for infants under 6 months plus enough staple foods to satisfy hunger from whatever is available for rest of family or group.

3. Lactating women: One quart of whole or skim milk or its equivalent in evaporated or dried milk, preferably fortified with 400 international units of vitamin D to the quart plus full food allowance for other adults.

For emergencies lasting more than 1 week

These additional groups should also be provided for:

1. Children from 2 to 6 years: At least 1 pint of whole or skim milk or its equivalent in evaporated or dried milk, preferably fortified with 400 international units of vitamin D to the quart plus staple foods to satisfy hunger.

2. Women during the last half of pregnancy: Same as for lactating women.

Protection Against Contamination

The usual hazards to infants and young children from contaminated water and milk are greatly increased under emergency conditions. Contamination from "peace-time bacteria" is likely to be the greatest threat since public water supplies may become polluted, facilities for sterilization by heat and for refrigeration nonexistent, and the job of preparing the food entrusted to inexperienced volunteers. In addition there are the potential dangers associated with atomic, biological, or chemical warfare.

Because water that has been made safe for general consumption by emergency treatment is believed suitable also for infants, those responsible for infant feeding under disaster conditions may well concentrate on techniques for formula preparation. Both the milk mixture and the container from which it is served should be free from contamination at the time of feeding. Experts in food sanitation can indicate safe emergency measures for sanitizing bottles and nipples when boiling water or steam is unobtainable. Terminal heating of the assembled unit—filled bottle with nipple in place and, if possible, protected by a nipple cap—should be employed whenever feasible. The time of sterilization in a boiling water bath should be the full 25 minutes currently recommended by the American Hospital Association for hospital formula rooms and by the Children's Bureau for home use. In the household where refrigeration is unavailable, the bottles of sterilized formula should be left in the tightly covered container in which they were processed, removing only as many bottles as are needed for a feeding and replacing the cover on the kettle at once.

Bolstering Emotional Security

The foods given to young children and the conditions of emergency feeding have profound implications for their emotional reaction to a disaster. The experience of war-ravaged countries has proved how important it is that infants and young children be given familiar foods by familiar hands. As the British reports during the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense in London brought home repeatedly to those of us from overseas, emergency feeding is not necessarily mass feeding. Especially in the case of infants and young children, every measure should be taken to provide the necessary food within the accustomed setting of the family, the home, or the immediate neighborhood. The household that has a few days' supply of essential foods and fluids for young children on its emergency shelf and that knows how to improvise equipment for cooking and cleansing may not have to expose its most vulnerable members to the disturbing surroundings of an emergency feeding center. When mass care cannot be avoided, either in a temporary rest center or in the course of evacuation, the presence of a familiar figure, preferably the mother, will help to minimize the sense of insecurity. If breast feeding can be maintained under emergency conditions, both mother and infant will benefit. It is to give all possible encouragement to the lactating mother that special food allowances are recommended for her under emergency conditions even of short duration. Physiologically, it is of little consequence that her nutritive needs be met during an emergency of a few days' duration. Psychologically, she may profit greatly from the recognition of the contribution that she is making to the well-being of her baby and to society.

Ideas

Seeing Is Believing

CONNECTICUT. State restaurant inspectors recently introduced a modification in their swab-testing program. They streak a Petri dish of nutrient agar and leave it on the premises to incubate.

At the end of the 48 hours, they revisit the establishment. The food service personnel are asked to estimate the number of bacteria colonies. Then, the cover of the badly contaminated dish is removed, and the personnel are given a whiff of the obnoxious gases which have accumulated.

Such an olfactovisual demonstration is far more convincing to owners and food handlers than a mere typewritten report of the number of colonies discovered by laboratory count. The State health department reports that it has had a veritable spate of requests for materials and methods to improve dishwashing procedures. So satisfactory has been the demonstration, the health department believes special classes for food handlers can be eliminated this year. Proprietors and food-service personnel alike have exhibited a sincere desire to improve the sanitary ratings of their establishments.

Community Evaluation

NEW JERSEY. The State health department has developed a survey or evaluation form for use by local citizen groups who are concerned about their local health situation—what it is—what is needed.

The citizens group fills out the survey form, requesting the assistance of the State health department whenever necessary. The completed survey is analyzed in the State office. Then, a health planning team—State district health officer, public health engineer, supervising nurse, community health organizer, and statistician—will meet with the local group to explain the deficiencies found in the local service and ways of overcoming them.

Laboratory Suggestion

BROOKLYN, N. Y. Save purchasing capillary tubes—substitute a 4-inch metal needle for a capillary pipette in adding blood to the Wintrobe sedimentation rate tube. The needle should be long enough to reach to the bottom of the Wintrobe tube.

Glass capillary tubes may last only once, the laboratory of the Public Health Service Hospital at Manhattan Beach has discovered, but a steel needle will last indefinitely.

Immunization Drive Cartoons

LOS ANGELES, CALIF. For 3 years in a row, artist Bruce Russell of the *Los Angeles Times*, a Pulitzer prize-winning cartoonist, has contributed his gifted pen to the annual immunization drives of the Los Angeles health department.

Titled (reading from the left) "The Narrow Distance Between Two Points," "Two Birds, One Stone," and "Guardian Angel," one of the cartoons below appeared on the opening day of immunization in the public schools when wide-scale publicity called the attention of parents to the need for immunization.

Immunization results showed the effectiveness of intensive newspaper, radio, and television publicity—each year's drive from 1949 through 1951 went over the goal.

Cancer Control in the United States

By RAYMOND F. KAISER, M.D.

The expanding attack on cancer has been sharply accelerated during the past 5 years by the efforts of public health agencies and other groups throughout the country to reduce mortality from this disease through early suspicion, accurate diagnosis, and effective treatment. These well-directed efforts at cancer control add a new and powerful force to basic and clinical research.

An upsweep of public interest following World War II contributed much to the establishment of cancer control programs. Even more vital have been the contributions of State health agencies, voluntary organizations, hospitals, universities and medical schools, and other institutions. Many of these groups have received Federal support under the cancer control program of the National Cancer Institute of the National Institutes of Health, Public Health Service.

The extent of the cancer problem makes clear why public health emphasis on cancer is strong. In relation to other diseases, cancer has advanced in the last 30 years from sixth to second place as a cause of death in the United States. It is responsible for more than 200,000 deaths a year and accounts for 14 percent of mortality from all causes.

Control programs are aimed at reducing cancer mortality: first, by finding ways to shorten the dangerous intervals between the onset of the disease and diagnosis, and between diagnosis and the start of treatment; and second, by improving cancer diagnosis and clinical management. To these ends, real progress has been made since 1947 in developing programs of action throughout the country.

Today, official agencies in all the States, the District of Columbia, Alaska, Hawaii, Puerto Rico, and the Virgin Islands have cancer control programs. Thirty-three States and the District of Columbia are making specific appropriations for cancer control activities. In the District of Columbia and more than half the States and Territories, cancer has been made a reportable disease. Cancer teaching programs in almost all of the Nation's medical and dental schools have been strengthened. Postgraduate training of physicians in the field of cancer has been expanded, and educational programs for public health workers, general practitioners, dentists, and nurses have been started. Intensive public educational campaigns—notably those of the American Cancer Society and the National Cancer Institute—are under way, and substantial improvements have been made in the treatment facilities and diagnostic services reaching the individual citizen.

Increased Federal support has been an important factor in the accomplishments of the past 5 years. Up to July 1946, when Congress appropriated $2,500,000 for cancer grants to the States, the Public Health Service had been able to assist State and community cancer control activities only through consultation services and funds amounting to less than $250,000 a year. Since then, the National Cancer Institute has allotted $17,300,000 in Public Health grants-in-aid for expansion of the cancer control programs of the States, the District of Columbia, Alaska, Hawaii, Puerto Rico, and the Virgin Islands. During this period $14,815,000 has also been allotted in special grants-

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in-aid to institutions and individuals engaging in educational, research, and clinical projects dealing with cancer control. These allocations are made with the advice of a Cancer Control Committee of 12 members representing the American College of Surgeons, American Cancer Society, State health departments, hospitals, and medical schools.

Professional Education

Since the person with cancer is usually seen first by his family doctor, major cancer control emphasis is on programs designed to improve the diagnostic ability of the general practitioner. Such programs not only offer better professional education to undergraduates, graduates, and postgraduates, but also provide diagnostic and other special services to help the practicing physician.

So that oncoming general practitioners will be better prepared to meet the cancer problem, teaching grants totaling more than $7,000,000 have been made to 79 medical schools to augment teaching staffs and to provide training materials (*1*).

Postgraduate training for physicians has also been emphasized. Clinical traineeships totaling about $2,000,000 have assisted 450 young physicians, including 14 women, in taking advanced training in radiology, surgery, pathology, and other specialties. These physicians are established in practice or in positions where their special training benefits cancer patients.

In addition, many new aids to better cancer diagnosis and therapy are available to all physicians in general practice. The American Cancer Society and the National Cancer Institute have jointly produced a series of motion pictures on the problem of early diagnosis of cancer. A collection of slides assembled by the National Cancer Institute shows typical lesions and other aspects of the disease. Information on the progress of research, development of control techniques, and epidemio-statistical activities is available in printed form.

Thirty-nine of the Nation's dental schools have also used grants of funds to give students better grounding in cancer pathology, recognition of early lesions, and principles of cancer diagnosis and treatment (*2*). An oral cancer exhibit and a set of projection slides showing oral cancer lesions have been made available to dentists throughout the country, and special cancer education programs for practicing dentists have been conducted by the State health departments of Idaho and Michigan.

Physicians add to their knowledge of cancer by taking part in meetings of hospital tumor boards. In the board meeting shown here a physician (standing) discusses a cancer patient with the director of the tumor clinic and other members of the tumor board while medical students look on.

Nurses and Cancer Control

The extent to which public health nurses and other registered nurses have been brought into cancer control accounts for much of the success of these programs. Regular courses in cancer nursing and cancer control are now taught at the University of Minnesota and Columbia University. Early in 1952 the Department of Nursing at Skidmore College, New York, and the School of Nursing at Boston University began pilot studies to develop better methods for teaching undergraduate nurses about cancer. For this they are using a monograph on "Cancer Nursing in the Basic Professional Nursing Curriculum—Suggested Content and Methods," provided by the National Cancer Institute. Another aid, "Cancer Nursing—A Manual for Public Health Nurses," produced by the New York State Department of Health

and the National Cancer Institute, is being widely used.

Cancer nursing seminars have been conducted in several States, Hawaii, and Puerto Rico, and a number of universities have offered concentrated, full-credit courses in cancer nursing.

Programs for Public Health Workers

The increasing public health problem of cancer is of special concern to health educators, medical social workers, statisticians, medical record librarians, and other public health personnel.

The Schools of Public Health at Yale, Harvard, and the University of Michigan have made use of grants-in-aid to establish courses in cancer control for public health workers. A number of cancer publications for public health workers have been prepared by various organizations during the last 3 years. The newest is "Cancer Control: A Manual for Public Health Officers," developed cooperatively by the New York State Department of Health and the National Cancer Institute, and soon to be published.

Pharmacists throughout the country became active in cancer control programs in 1948 through an educational campaign conducted by the American Pharmaceutical Association and the National Cancer Institute (*3*). During the year-long campaign, pharmacists in some 15,000 drug stores displayed counter cards to the public and posted bulletins in their prescription rooms giving information on the signs of early cancer.

Public Education

Effective measures for cancer control have their foundations largely in public education. Public and voluntary agencies in the cancer field have evolved programs of public information and education designed to enlist the cooperation of the layman by alerting him to the threat of cancer and guiding him to medical aid.

A timely example of public educational work is the nation-wide campaign to control breast cancer by urging women to adopt a simple procedure for monthly self-examination and to report to a physician any lump or other abnormality discovered. State health departments, the American Cancer Society, the medical profession, and many other organizations have joined in a campaign to carry this message to the 32,000,000 American women 35 years of age and older. This is being done through showing a 15-minute motion picture, "Breast Self-Examination," jointly produced and distributed by the American Cancer Society and the National Cancer Institute.

The public learns about cancer from exhibits like this. Women's clubs and professional groups in the United States are using the exhibit shown above in the campaign to control breast cancer.

It is still too early to estimate the number of lives which may be saved by this campaign. However, a long-range study undertaken during 1951 in Iowa by the State Medical Society, the State Health Department, the Iowa Division of the American Cancer Society, and the National Cancer Institute is expected to provide basic data for a representative population of American women. Effectiveness of the film in teaching women how to examine their breasts has been indicated in a preliminary study made in New Haven by the Yale University Department of Public Health. This study found that 77 percent of the women who had not previously examined their breasts did so as a result of seeing the film (*4*).

Other instruments for public educational use have been developed. One especially suitable for high school and college students is the motion picture, "Challenge—Science Against

Cancer," sponsored by the Canadian Department of National Health and Welfare and the National Cancer Institute of the Public Health Service. The film points up the meaning in cancer research of new achievements in biology, physics, chemistry, and genetics.

Public educational work is also aided by a variety of pamphlets, leaflets, and other publications. Distribution of material of this kind in 1 year alone totaled 11,374,950 (*5*). These publications reach virtually all segments of the general population through activities of the American Cancer Society, the Public Health Service, State, county, and city public health departments, women's clubs and other organizations, and physicians in general practice.

Cancer Diagnostic Services

Striking increases and improvements in cancer diagnostic services and treatment facilities have been made since 1947 (*6*).

The number of approved cancer clinics grew from 407 in 1946 to 659 in 1951, stimulated by funds granted to the American College of Surgeons and State health departments.

Thirty States, the District of Columbia, Alaska, Hawaii, and Puerto Rico have added tissue diagnostic services to their cancer control programs. In Kentucky and Florida mobile cancer diagnostic units have been provided for rural patients.

Tumor registers and tissue-slide loan services, established at a number of universities, medical schools, and hospitals, have greatly improved training facilities for pathologists.

Studies to develop improved cancer therapy have also been conducted by universities, medical schools, and hospitals in various parts of the country.

Case-Finding Studies

Searchers for a practicable cancer case-finding method are exploring the possibilities of screening the general population by conventional clinical methods or of finding a suitable clinical test for cancer.

Although none of the diagnostic tests developed thus far has proved specific or sensitive enough to be of practical value, work in this field continues. To develop new tests, a direct operational unit was set up at the University of Washington, Seattle, to work principally in the fields of immunology, enzyme chemistry, and blood proteins. Two national conferences have been held to review developments in the continuing search.

Cancer informational materials go abroad. Shown above are United States cancer magazines, books, pamphlets, and exhibits displayed in Paris at the Fifth International Cancer Congress, 1950.

The practicability of the cancer detection center as a case-finding device was studied during 1947 and 1948 by the National Cancer Institute through its operation of a cancer investigation center at Hot Springs, Ark. (*7*). The Hot Springs experience indicated that the detection center as such did not offer an economical, practical approach to the problem of controlling cancer. The study revealed that the vaginal cytologic test of Papanicolaou might be useful for screening the general female population. To obtain a group large enough for such screening, the center was moved to Memphis, Tenn. In general, most authorities feel at the present time that cancer detection centers have served a definite educational role for the profession, as well as the communities where they are located, by demonstrating the need for cancer clinic services in an area. The present tendency is to convert detection centers into cancer clinics.

Six cytology training centers are now in operation, one each at Cornell University, Tulane and Louisiana State Universities, and the Universities of California, Colorado, and Oregon.

Environment and Cancer

Environmental cancer-causing hazards and their control are subjects of intensive study. State health departments are conducting occupational and environmental cancer studies and surveys of selected industries in California, Colorado, Connecticut, New Jersey, Ohio, and Pennsylvania. Of special interest is the study of the exposure of workers and inhabitants on the Colorado plateau to radioactive substances in the uranium mining and processing industry. One completed occupational cancer survey in Ohio has yielded new facts and concepts on chromate cancer of the lung and associated health hazards. In a new project, the Ohio Department of Health is investigating possible cancer hazards to which workers in the rubber industry may become exposed.

Environmental cancer research units are also in operation at the Universities of Utah, Pittsburgh, and Southern California. The Utah unit is studying cancer hazards associated with the mining and milling of uranium ores and other radioactive materials. The Pittsburgh study deals with substances derived by high-temperature distillation of coal and coal tar products. The California group is investigating potential cancer-causing environmental hydrocarbons related to the petroleum industry.

Other work in this field is being done by the National Cancer Institute at its cancerigenic research laboratory established in 1949 at the Georgetown University Medical School in Washington, D. C. These investigators are studying environmental cancer-inciting agents in metals, environmental poisons, and synthetic oils.

Studies of Cancer Morbidity

Valuable new information on the size and nature of the cancer problem in the United States has been collected since the close of World War II.

New studies of cancer morbidity during 1947 covering 10 major metropolitan areas in the United States, first surveyed in 1937, have been completed by the National Cancer Institute. Individual reports have been published on the areas centering about San Francisco and Alameda Counties, Calif.; Atlanta, New Orleans, Denver, and Pittsburgh (see table); and, more recently, Chicago. Reports on Dallas, Detroit, Birmingham, and Philadelphia are in the process of publication.

These studies provide basic information on cancer incidence, prevalence, and mortality with regard to such factors as site, sex, age, and race. They re-emphasize the importance of

Incidence, prevalence, and mortality rates per 100,000 population for all cancers, 1947 and 1937, by sex

[Based upon data collected in Atlanta, San Francisco, New Orleans, Denver, and Pittsburgh, and adjusted on continental United States population, 1947.]

Item	1947			1937			Percent increase		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Incidence									
Number of cases	16,476	7,714	8,762	10,209	4,510	5,699	61.4	71.0	53.7
Crude rate	349.3	338.8	359.0	260.3	232.5	287.4	34.2	45.7	24.9
Age-standardized rate	341.2	342.9	343.4	269.5	249.9	290.6	26.6	37.2	18.2
Prevalence									
Number of cases	21,938	10,011	11,927	14,179	5,991	8,151	54.7	67.1	46.3
Crude rate	465.1	439.7	488.7	361.5	308.9	411.0	28.7	42.3	18.9
Age-standardized rate	453.9	445.2	467.4	373.9	332.4	417.3	21.4	33.9	12.0
Mortality									
Number of deaths	6,748	3,302	3,446	4,711	2,197	2,514	43.2	50.3	37.1
Crude rate	143.1	145.0	141.2	120.1	113.3	126.8	19.2	28.0	11.4
Age-standardized rate	140.8	148.1	135.8	126.2	123.6	129.7	11.6	19.8	4.7

the various programs directed toward early case finding and early diagnosis.

Cancer in Human Experience

Much is being learned from cancer epidemiology, the study of cancer in human experience. Its immediate objective is to describe group characteristics associated with cancer and those associated with its absence, with the ultimate aim of explaining the natural history of cancer and thus provide a basis for prevention and control.

Physicians at Beilinson Hospital in Israel are studying the incidence of cancer of the uterine cervix, other female genital organs, and the breast among Hebrew women in Israel. The ethnic distribution of cancer in Hawaii is receiving special attention in epidemiological studies by the Territorial Department of Health. Epidemiologists at the University of Southern California are studying cancer of the uterine cervix. The Medical College of Georgia is conducting a one-county study of the incidence and control of cervical cancer by general population screening. Genetics of human cancer are being investigated by scientists at the University of Utah. Other cancer epidemiology studies are being conducted by the Maryland State Department of Health, the University of Cincinnati, Georgetown University, and Washington University.

Epidemiological records collected from cancer clinics in New York City, St. Louis, and New Orleans are being analyzed at the National Cancer Institute to test, on a large series of cases, a number of factors thought to have etiological significance in human cancer and to evaluate the further usefulness of this type of study in learning more about the etiology of human cancer. Among factors being studied are the relationship of fertility and marital status to cancer of the breast and cervix, and the relationship between smoking and cancer of the lung. The geographic distribution of leukemia in the United States is also being studied.

There Is Hope

How well are we getting at the control of cancer?

The question is partly answered by a recent report of the Metropolitan Life Insurance Company which stated: "Some encouraging signs are already evident in the postwar record of industrial policyholders. A comparison of death rates for 1946–47 and 1949–50 shows reductions in mortality from the malignant neoplasms among white females at ages 25 to 74 years. For the accessible sites as a group, both sexes experienced declines in mortality, white males by 2.4 percent and white females by 7.2 percent. Both sexes were favored with reductions in mortality for such specific sites as the stomach, the intestines and duodenum, the rectum and anus, the liver and biliary passages, and the bladder" (*8*).

Other signs of progress can be seen. The atmosphere of pessimism which has surrounded the cancer problem for so many years is being cleared away. Knowledge of etiological factors of cancer is increasing. Improved techniques for cancer therapy are numerous and varied. Programs and facilities for maximum discovery, early diagnosis, and adequate therapy have been created. These advances point to a progressive reduction in the death rates from cancer and to control of the disease.

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Primary Isolation of Brucella From Human Blood Clots

By S. R. DAMON, Ph.D., DORIS BUNNELL, M.S., KATHLEEN GAY, B.S., and L. M. HUTCHINGS, D.V.M., Ph.D.

Clotted blood has been utilized by many laboratories as a dual-purpose type of specimen for aiding the physician in his differential diagnosis of brucellosis. The serum is used for the agglutination test, and the accompanying clot is cultured for the causative organism. Unfortunately, efforts at recovering *Brucella* from clots have not always proved productive.

In the bureau of laboratories of the Indiana State Board of Health, clot examination procedures were begun in the spring of 1946 as an adjunct to the seroagglutination test. Since that time more than 41,000 specimens have been examined serologically, and more than 10,000 of the accompanying clots cultured for *Brucella*. Experimentally, in vivo methods employing guinea pigs and embryonating eggs have at times supplemented the routine in vitro enrichment broth procedure.

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The investigation was a joint study between members of the two departments, and was supported in part by a research grant from the Division of Research Grants and Fellowships of the National Institutes of Health, Public Health Service. The Communicable Disease Center of the Public Health Service provided funds in partial support of the guinea pig investigations conducted at Purdue University.

In conjunction with the Indiana brucellosis project, an opportunity was provided to study the over-all technique of clot culturing. Consequently, during the period of this study (1946–50, inclusive), efforts were directed toward improvement of procedures and the development of a more productive isolation method. This paper is a report of the experimental use of several different mediums in isolating *Brucella* from clots.

Isolation Procedures

Specimens employed in this study were clots from samples of human blood submitted routinely to the Indiana State Board of Health laboratories for one or more of the febrile agglutination tests. The serum from each clot was decanted and tested for *Brucella* agglutinins with a standardized *Brucella abortus* slide test antigen. If complete agglutination occurred in the 1:80 serum dilution, or in the latter part of the study at the 1:20 level, the clot was examined by at least two of the isolation procedures. Some clots from persons exhibiting no agglutinins, or only a low titer, were included because of the special significance of such clots.

With the exception of such divergences as will be noted, the following methods were employed throughout the project.

C-V Broth Enrichment

Approximately one-half of each clot was forced through a 5-ml. syringe, without the

needle, into crystal violet tryptose broth (C–V broth), made up as follows:

Tryptose (Bacto)	3.0 gm.
Dextrose (Bacto)	1.0 gm.
NaCl	.5 gm.
Thiamine HCl (Betabion-Merck)	.5 mg.
Distilled water	100.0 ml.
Agar (Difco, granular)	.1 gm.

The ingredients were dissolved in an Arnold sterilizer and when necessary the solution adjusted to a pH of 6.6 to 6.8 with 1 N NaOH. One-tenth milliliter of crystal violet dye (1:1,000 aqueous solution) was added and mixed thoroughly. The broth was dispensed in 10-ml. amounts and autoclaved 15 minutes at 115° C.

The clot and the broth were mixed thoroughly and incubated at 36° to 37° C. under an increased CO_2 atmosphere of approximately 10 percent. The blood clot-broth mixture was incubated one week and then subcultured to crystal violet tryptose agar plates (dye concentration 1:1,000,000). Three weekly subcultures were made from the broth before discarding it as negative. This method is further discussed in a report by Damon and Albright (*1*).

Guinea Pig Injection

The remaining half of the clot was forced through the syringe into 20 ml. plain tryptose broth (Difco dehydrated product), and about once a week the accumulated specimens were transported to the department of veterinary science, Purdue University. (These clot-broth mixtures were incubated under increased CO_2 tension until the time of shipment.) At the laboratory of the department of veterinary science, a 2-ml. aliquot of each of the specimens was injected subcutaneously into the groin region of each of two guinea pigs. These pairs of animals were maintained in separate cages, and quartered in a building separate from that housing the stock supply. A month following the injections, the pigs were autopsied. Samples of heart blood were collected for agglutination tests and the spleens were cultured for *Brucella*, since previous experience had shown the spleen to be the most consistent site of isolation. Each spleen was bisected and the exposed surfaces serrated before streaking onto a plain tryptose agar plate. The inoculated plates were incubated in an atmosphere of approximately 10 percent CO_2.

Yolk Sac Inoculation

The yolk sac inoculation technique, described in detail in another paper (*2*), consisted of injecting 0.5 ml. of comminuted blood clot-tryptose broth mixture into each of four embryonating White Leghorn eggs 3 to 5 days old. The injections were made with a syringe and 20-gauge needle directly into the yolk sacs through a small opening in the large end of the eggs.

Typing of Cultures

For typing the species of *Brucella* recovered as above, both serologic and biochemical reactions were determined. Each isolated strain was checked for CO_2 growth requirements, ability to produce H_2S, and dye inhibition on basic fuchsin and thionin plates (dye concentration 1:100,000). Strain antigens were tested against known *Brucella* antiserums.

Initial Use of Enrichment Broth and Guinea Pigs

Over a period of 3 years 1,698 human blood clots were examined both by guinea pig inoculation and by C-V broth enrichment as previously described. From these specimens 90 *Brucella* strains—61 *abortus*, 21 *suis* and 8 *melitensis*—were recovered, representing a 5.3-percent isolation.

In table 1, the 90 isolations have been tabulated as to the species and the method or methods of recovery. It is to be noted that only 26 of the 90 isolations, or 28.9 percent, were obtained by both broth enrichment and guinea pig inoculation of the same specimen. In other words, 64 *Brucella* strains, or 71.1 percent, were recovered by only one or the other of the techniques. This inconsistency appeared not to involve any one species.

From the foregoing results, it was evident that the two techniques for isolation were quite inconsistent in yielding duplicate recovery of *Brucella* strains. Although actually more recoveries were obtained from the C-V broth enrichment of the clots, the use of the guinea pigs added considerably to the total isolations.

As previously noted, that portion of the clot received by the guinea pigs was first inoculated into plain tryptose broth and held at 37° C. under increased CO_2 tension for several days

Table 1. Recovery of Brucella from C-V broth inoculated with clotted blood and from guinea pigs inoculated with clotted blood enriched in plain tryptose broth

Species	Guinea pig+ broth−	Guinea pig− broth+	Guinea pig+ broth+	Total recoveries from	
				Guinea pig	Broth
Br. suis	8	8	5	13	13
Br. abortus	16	28	17	33	45
Br. melitensis	2	2	4	6	6
Total	26	38	26	52	64
Percent isolations	28. 9	42. 2	28. 9	57. 8	71. 1
	Grand total = 90 strains				

prior to injection. It seemed plausible that this preliminary enrichment of the inoculums might have been a determining factor in the incongruity of the results. The question then arose as to how efficient a medium of isolation the guinea pig would be if the clotted blood material were inoculated directly, following the same technique as before but excluding the initial enrichment of the clot.

The following experiment was then conducted in order to determine, if possible, the value of the guinea pig as an isolation medium when unenriched clotted blood was injected. Furthermore, since by this time an egg yolk sac inoculation technique was being used experimentally with some success, it seemed desirable to expand the study so as to compare this method with the guinea pig and C-V tryptose enrichment broth procedures.

Experimental Methods

The type of specimen was the same as previously employed, except that all clots from serums showing complete agglutination with the slide antigen at the 1 : 20 dilution level were included.

One-half of each clot was inoculated into C–V tryptose broth for enrichment and subcultured periodically as previously described. The other half was expelled through a syringe into a bottle containing 5 to 7 ml. of plain tryptose broth and small glass beads. The bottle was then shaken 3 minutes to further disintegrate the clot. This was the inoculum for the guinea pigs and for the embryonating eggs whenever used. Duplicate guinea pigs were inoculated subcutaneously with 1.0 to 1.5 ml. of this mixture at the Indiana State Board of Health laboratories. Each pair was placed in a separate cage and the animals were transported to the veterinary research laboratory, Purdue University, where they were kept for 1 month before they were sacrificed for the examination. For a part of the experiment, 0.5 ml. of the same inoculum was injected concurrently into each of four embryonating White Leghorn eggs 3 to 5 days old, as already described.

Results

Over a period of 1½ years, 276 blood clots were examined for the presence of *Brucella* organisms. A total of 181 specimens was injected into both C-V tryptose broth and into guinea pigs; and 95 were examined by inoculating C-V tryptose broth, guinea pigs, and embryonating eggs as previously described.

Ten *Brucella* strains were isolated from the group of 181 specimens inoculated into guinea pigs and C-V broth. Two of the strains were recovered from the guinea pigs, whereas portions of the same specimens, following enrichment in the C-V broth, yielded 9 strains. One strain was isolated from both mediums. All recoveries were identified as *Br. abortus*.

From the 95 specimens examined by inoculation into the C-V broth, guinea pigs, and embryonating eggs, a total of 13 *Brucella* strains was recovered. The species and methods of isolation are tabulated in table 2. Twelve of the 13 strains were isolated via the embryo yolk sac technique. The guinea pigs yielded 1 strain

Table 2. Methods of recovery of Brucella (13 strains) from blood clots examined by injection into guinea pigs, C-V broth, and embryonating eggs

Species	Number of recoveries from		
	C-V broth	Guinea pig	Eggs
Br. suis	2	1	3
Br. abortus	4	0	8
Br. melitensis	0	0	1
Total	6	1	12

and the C-V broth 6 strains. The 1 strain which was not recovered from the eggs by the method employed was a *Br. suis* and was isolated from both the guinea pigs and the C-V broth.

The results of the entire study as reported in this paper are summarized in table 3, with a division of the data into three categories. The first group comprises the initial attempt at isolating *Brucella*, during which time that portion of the clot to be injected into guinea pigs received a preliminary broth enrichment. The second group is the experimental group, in which the guinea pigs were injected without prior enrichment of the specimens and concurrently with the inoculation of the C-V broth. The third group of data includes only those clots which were examined by injection into all three mediums—embryonating eggs, C-V tryptose broth, and guinea pigs.

The use of the three mediums as indicated in the third group increased the total percentage of isolations from 5.3 to 13.6 percent. This increase was primarily due to the inclusion of the egg embryo technique. Statistically, there was no significant difference found in the percentage of isolations yielded by the C-V broth alone in any of the three categories. Likewise, in the first group, the difference in the percentage of isolations yielded by the C-V broth and by the guinea pigs was not found to be significant; however, in the second series, the opposite was true. The guinea pig technique was significantly inferior to the use of C-V broth in the isolation of *Brucella* from the blood clots.

In the third group of data only 95 specimens are included as being examined by all three methods. Although this number is not sufficient for a final statistical evaluation, it is obvious that a difference in the abilities of the three mediums to isolate *Brucella* does exist. Of the 13 recoveries from this group, only 1 is accredited to the guinea pig and less than half to the C-V broth. On the other hand, the embryonating eggs yielded all but 1 of these strains.

Of the guinea pigs injected, only the ones yielding an isolation had developed a titer. The remaining guinea pigs showed no evidence of agglutinins.

Discussion

The guinea pig, as employed in this study, appeared of little value in the primary isolation of *Brucella* from clotted blood material when the specimens were injected directly, without a preliminary enrichment. However, when the

Table 3. Summary of results of using different techniques for isolating Brucella from blood clots

Group	Number specimens	Treatment of clot	Total strains recovered		Results of examinations		
			Number	Percent	Strains isolated	Strains missed	Percent isolations
1	1,698	Incubated in tryptose broth, then injected into guinea pigs	90	5.3	52	38	3.1
		Incubated in C-V broth			64	26	3.8
2	181	Injected directly into guinea pigs	10	5.5	2	8	1.1
		Incubated in C-V broth			9	1	5.0
3	95	Injected directly into guinea pigs			1	12	1.1
		Incubated in C-V broth	13	13.6	6	7	6.3
		Inoculated into embryo yolk sacs			12	1	12.6

blood inoculums were incubated in tryptose enrichment broth for several days prior to injection, different results were obtained. In the former instance *Brucella* was recovered from only 1.1 percent of the specimens; under the latter conditions the organism was recovered from 3.1 percent. It is believed that the number of organisms in the inoculums, rather than increased resistance of the guinea pig stock to *Brucella* infection, was a principal factor in the differing results obtained during these two phases of the investigation. This guinea pig stock was also being currently employed in other experiments, and there was never an indication that the animals might have suddenly developed an immunity to *Brucella* infection.

Of the in vivo methods, which involved the injection of both unenriched and enriched clots into guinea pigs, and of unenriched clots into embryonating eggs, the latter procedure gave the highest percentage of recoveries from the clots examined and has to date appeared superior to the in vitro C-V tryptose enrichment broth technique.

From the 1,974 specimens included in this study, 113 (5.7 percent) recoveries were made. This proportion is much higher than that reported by West and Borman (*3*) when clots from all specimens submitted for agglutination tests were cultured, including those from negative serums. It is lower than the total percentage of recoveries made in the laboratories of the Georgia Department of Public Health (*4*) when special blood culture outfits were used for collecting specimens from persons exhibiting agglutination titers of at least 1:320 in order to supplement clot culturing. However, based on the limited number of clots injected into embryonating eggs, this medium yielded as high a percentage of isolations as the Georgia laboratories obtained with their special supplementary specimens.

The culturing of all clots routinely, without regard to titers of the accompanying serums or symptomatology of patients, has not proved very profitable in this laboratory. From 7,906 unselected clots, only 0.3 percent isolations were obtained, with only two recoveries from specimens with negative agglutination titers (*1*). In conclusion, clot examinations in the bureau of laboratories of the Indiana State Board of Health have been quite profitable when clots were selected from specimens with an agglutination titer of at least 1:40, and especially when these clots were injected into embryonating eggs.

Summary

During 4½ years, three basic techniques for the isolation of *Brucella* from human blood clots—employing guinea pigs, a crystal violet tryptose enrichment broth, and embryonating chick eggs—were studied.

Altogether, 1,974 specimens were examined and 113 *Brucella* strains were recovered: 79 *Br. abortus*, 9 *Br. melitensis*, and 25 *Br. suis*.

It was found that the incubation of portions of the blood clots in tryptose broth for several days before injecting them into guinea pigs apparently accounted for most of the isolations obtained from guinea pigs. Injection of clotted blood directly into these animals yielded very few isolations. Of the three methods of isolation, the guinea pig proved the least efficient and the egg inoculation technique yielded the largest percentage of recoveries.

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A Perspective on Rat Control

By DAVID E. DAVIS, Ph.D.

Rat control is clearly a problem in the management of a species so that the numbers will be reduced. Management in general implies altering the abundance of a species according to our desires. For example, management of cattle suggests a planned increase in numbers or size; management of a fish pond implies increase of some fish and decrease of others. Since rat control is merely a specific case of management, a perspective on rat control probably can be obtained by examining the field of wildlife management as a whole and by placing the management of rats in relation to the knowledge about other species.

The abundance of every species is regulated by a variety of factors. The inherent physiological and psychological capacities of a species are affected by such factors as temperature, food, disease, and others. But at a specific time and place some particular factor limits the population by its scarcity or excess. In winter an inadequate food supply may limit the deer population by starvation. In southern States the temperature may be too high during the incubation period of pheasants for survival of the embryos. The regulatory factor which governs the population at a specific time and place is called the limiting factor. It is essential for an understanding of the management of populations to remember that the limiting factor may be one thing in one place and another thing in another place. For example, a quail population may be limited by food supply in one field, by shelter in another field, and by disease in still another field. The bewildering complexity of the interactions of limiting factors is both a challenge and an annoyance to the investigator.

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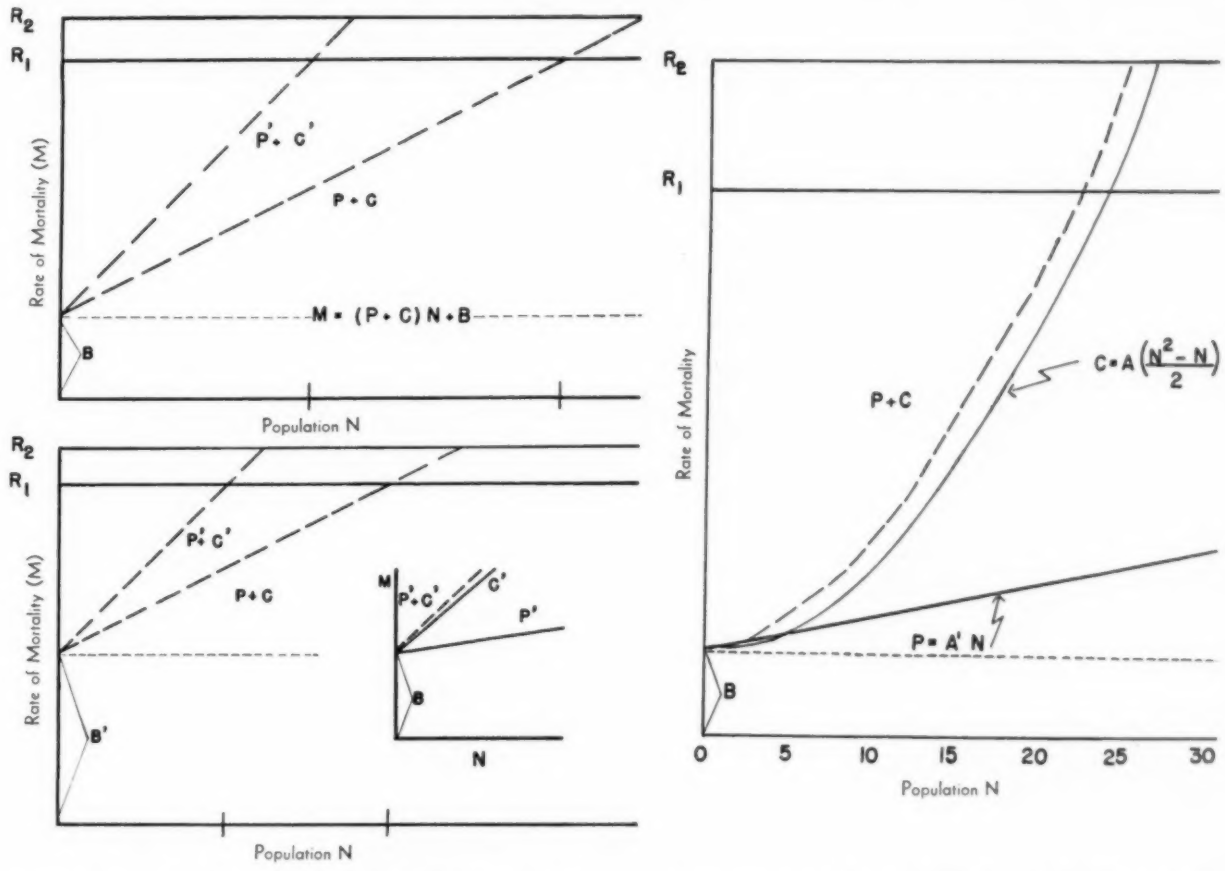
The Regulatory Factors

Fortunately, it is possible to group the regulatory factors into three classes—environment, predation, and competition—to facilitate analysis. Environment includes food, shelter, temperature and soil type. Predation includes foxes, traps, and diseases, and competition is the fighting for the limited supply of the environmental necessities.

Although these three groups are all regulatory factors, there is a difference between environment and the latter two types. Environment is considered to be density-independent. This phrase means that an environmental factor affects the same proportion of the species irrespective of the size of the population. For example, low temperature may kill 10 percent of the mosquitoes whether there are 100, 1,000, or 10,000 present. In contrast, predation and competition are considered to be density-dependent and to affect a changing percentage of the population according to its size. Interspecific competition is density-dependent and for simplicity may be classed as predation or competition according to circumstances.

The contrast between the environmental and the predation and competition factors is illustrated by figure 1, modified from Smith (*12*). The horizontal axis represents the population and the vertical axis the rate (percentage) of

Figure 1. Theoretical scheme for clarifying interaction of environment, predation, and competition.



mortality. In the upper left-hand chart the environmental factors (density-independent) account for a constant percentage of mortality given by B (dotted horizontal line). We assume that the reproductive rate is fixed at some value (R_1 or R_2) and is constant at all sizes of population. Predation and competition together (density-dependent) account for an increasing percentage of mortality as given by the two examples (P+C, P′+C′; dashed lines). Where these dashed lines reach the upper horizontal lines (reproductive rate), the population will be stationary because the rate of mortality equals the rate of reproduction. In this example, the environmental factors are responsible for a small proportion (B) of the mortality, but in the lower left hand chart the environment (B′) is responsible for a much larger proportion. Although the slopes of the predation and competition (P+C) lines are the same as in the upper chart, the population at equilibrium of mortality and reproduction is much lower.

Now we need to introduce a theoretical refinement into the predation and competition term. It is probable that predation is proportional to the population ($P=A'N$), but competition is probably proportional to some power of the population. One relation is $C=AN^2$ since this expresses the number of collisions. Another relation is $C=A\left(\frac{N^2-N}{2}\right)$ where the term $\frac{N^2-N}{2}$ gives the number of interactions of N objects moving at random. If we use the latter equation for C, we get the rapidly ascending heavy line in the right-hand diagram. Adding P to it gives the ascending dashed line.

This scheme obviously is a simplification of natural conditions and cannot be translated into wildlife in detail, but it clarifies the relationships of the regulatory factors. A change in any of the three groups of factors will change the population number at equilibrium of mortality and reproduction. Control of a species

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thus becomes a question of the feasibility of changing the factors, or, in its simplest terms, of how much it costs in time and money to change B or the slopes of P or C. This cost is determined by local conditions for each species and is naturally extremely variable. It is hard to change the slope of C, because this implies changing the inherent psychology of the species. Therefore, only environment (B) and predation (P) remain to work with.

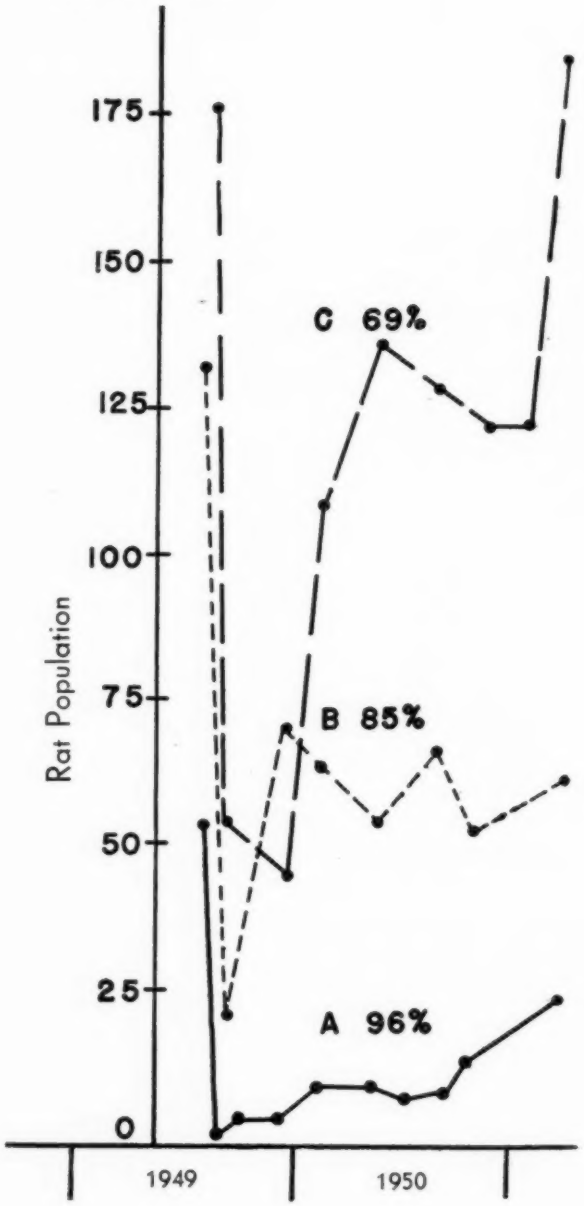
Predation Intensity

Clearly, a sufficient increase of rate of predation will reduce the population. Existing data help to indicate how much increase in predation is sufficient. For insects there is considerable evidence that predation can be increased under some conditions (*13*), but for vertebrates there is little evidence that natural predators or disease hold a population below the level determined by density-independent factors. For example, Errington (*4*) found no increase in rate of mortality from predation in many species. These data show that under usual conditions the predators are well adjusted to their prey and have little effect on the numbers. Indeed, even intensive hunting did not reduce pheasants in Michigan (*1*). But these cases are at one end of a scale of intensities. The slope of the predation rate can be any value from 0 to 1—no predation to complete predation (right-hand diagram, fig. 1). Krumholz (*5*) found that *Gambusia* clearly limit the population of mosquito larvae. Russell (*11*) summarized the obvious effects of excessive fishing on supplies of commercial fish. Rothschild (*9*) quotes many cases of extermination of birds by cats, dogs, and rats on islands.

Thus, there is a continuous series of examples from no effect to complete extermination. It is even possible that predation is not intense enough for maximum population. Swingle and Smith (*14*) showed that increased fishing was desirable to increase the yield from farm ponds in Alabama, while Lynch and associates (*8*) found that intensive trapping of muskrats was necessary to prevent the muskrats from increasing so greatly that they destroy their habitat.

Although predation may occur at any intensity, the practical problem is how to attain the proper intensity of predation in a given circumstance. Whether the result is a trivial effect or extermination depends upon the effort expended. In actual practice the effort ex-

Figure 2. Changes in rat population in blocks in Baltimore after poisoning with compound 42 (warfarin). In the smallest block (A) the greatest decline (96 percent) was obtained and the slowest subsequent increase. In block B a good reduction (85 percent) resulted. In the largest block (C) a fair reduction (69 percent) was followed by a rapid return to the original number.



pended is rarely enough to reduce the population to a satisfactory level. Poisoning and trapping, for instance, have as yet been unable to reduce rats to the low level desired by the health officer. Poisons and traps can reduce rats enough to satisfy the farmer and some householders, but that is a question of sanitation standards.

Change in Reproduction

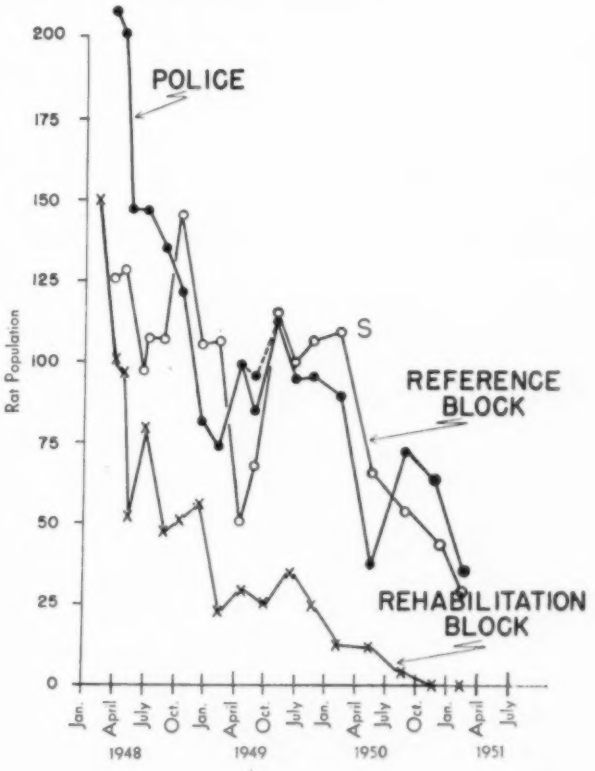
The converse of a change in mortality is, of course, a change in reproduction. The upper horizontal line in figure 1 represents rate of reproduction, which is assumed to be constant, although it probably is concave downwards. If reproduction is increased from R_1 to R_2 and the slopes of the predation and competition lines are not changed, the population will obviously increase. Reproduction can be increased in several ways: (*a*) some heredity mechanism; (*b*) increased food and shelter; and (*c*) artificial introductions of young or adult individuals. The first is outside the scope of this discussion since we are assuming a given species. The second is obvious: more food and shelter mean more reproduction. The third is a favorite panacea of sportsmen for all hunting troubles. Although it is possible to raise game or fish and release them in areas where sportsmen can get them, this system soon degenerates into the notorious "put-and-take" scheme in which the game commission dumps trout into the stream a few yards away from the fishermen who catch them.

The problem of stocking fish and game, like predation, is a question of intensity. Examples can be cited for the whole gamut of results from trivial effect to satisfactory solution. But as a practical problem of dollars and cents, stocking rarely is effective at a level that the sportsmen will support by taxes or fees. Buechner (*3*) showed that success was seldom attained with quail. Fish hatcheries have limited value for the improvement of fishing (*10*). But stocking has a place. Baumgartner (*2*) showed that the stocking of quail was beneficial in low populations but not in high populations. Krumholz (*6*) discusses the obvious conclusion that stocking newly constructed farm ponds is beneficial. Unfortunately, for higher vertebrates the predation + competition line rises very steeply at high populations, and hence great expense is required to increase the population by stocking methods. Thus, as in predation, a problem of practicability confronts the investigator.

Predation Results

What are the practical means at our disposal for changing the population? It is clear that an increase in predation (the slope of line P, fig. 1) will reduce the population. This increase can be obtained for a sum of money that may or may not be available, depending upon conditions. But increase of predation also reduces competition and thereby makes conditions better for the survivors. Thus, the increase of predation is partially opposed by a reduction in competition.

Figure 3. Results of three levels of intensity of environmental control of rats in blocks in Baltimore. The "rehabilitation block" was greatly improved. The "police block" was partially improved. The "reference block" was not changed until January 1950 (S). The reduction in rat population is proportional to the intensity of rehabilitation.



In contrast, an increase of B (mortality due to environment) will reduce the population more effectively because B is increased by reducing the food and shelter. These measures, however, have additional effects. The rate of reproduction is decreased and the slope of the rate of predation is increased.

Conversely, a decrease of B will increase a species. These changes in turn also increase the rate of reproduction and decrease the rate of predation. Thus, this management procedure has three means of action.

The results of predation can be compared directly for rat populations in three blocks in Baltimore. Figure 2 shows the history of rat populations in three blocks in which compound 42 (warfarin) was used by a highly competent technician. The percentage reduction was greatest in the block with the smallest population, and also the increase was least in the block with the smallest population. These three populations show the points emphasized above. Predation can be intense enough to be satisfactory in some blocks (A), but it is often unsatisfactory (C). The question is simply how frequently the reduction in A can be accomplished. Unfortunately, budgets are a limiting factor in such accomplishments.

Housing Improvements Effective

Contrasted with poisoning is the rat reduction resulting from improved housing and sanitation in blocks rehabilitated by the Baltimore City Health Department (fig. 3). The "rehabilitation block" was inspected by the health department in April 1948, and the rat population was eventually exterminated. The "police block" was inspected by the police, who do less intensive work. The "reference block" was not affected until January 1950, when sanitation (S) was begun. The difference in results in the poisoning experiments needs no comment, but the costs do. The only cost of rehabilitation to the taxpayer was for inspection and enforcement. The actual sanitation was performed by the tenants and landlords. No figures on cost per premise are available, but the cost must be divided according to the benefits in all aspects of housing because the rehabilitation consisted of improving the construction, repairing the floors, cementing the cellar, correcting the plumbing, cleaning the yard, and similar improvements. If we assume the average cost is about $50 and that the actual rat work is one-fifth of the total, then the rat control is $10 divided between tenant and landlord. This multiple benefit aspect is extremely important. Few cities would advocate a rat control program at $50 a premise, but many would at $10 a premise.

Summary

This discussion has emphasized the problem of intensities and interrelations. Rat control is simply a problem of increasing the mortality rates. A perspective derived from comparison of other species shows clearly that a change in the environment gives the most results for the money spent. But in some cases, for economic or cultural reasons, the expenditure of even moderate sums is impossible. In these areas the cost of temporary poisoning jobs must be met until adequate improvements in conditions can do a real job.

The simple objective of getting rid of rats is too narrow to merit the attention of health officers. The worthy objective is to improve living conditions so that a variety of diseases and pests will disappear and a better community will result.

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New Aid For Venereal Disease Nursing

In response to inquiries by public health nursing educators about the nurse's responsibility in the changing pattern of venereal disease control, the Public Health Service, through the Division of Venereal Disease Control in the Bureau of State Services, cooperated with the Georgia State Department of Health in holding a 2-week work conference early in 1951 at the Alto Medical Center, Alto, Ga. Sixteen States and 23 universities were represented by faculty members attending the conference.

An outgrowth of the conference is the publication of a 28-page "Suggested Outline for the Teaching of Venereal Disease Control," by the National League of Nursing Education, 2 Park Avenue, New York 16, N. Y. Divided into three major units, the outline covers: medical aspects of venereal disease; venereal disease within the framework of nursing; and community education in venereal disease.

The outline is planned to serve as groundwork for revising courses of instruction for the student nurse in venereal disease control. Its use will depend on the individual instructor, the needs and interests of the students, available resources, the scope of the curriculum, and the area where the school of nursing is located. Methods and activities are suggested to the instructor for selecting realistic activities in the development of learning situations.

The Practical Management *of the* Recalcitrant Tuberculous Patient

By CEDRIC NORTHROP, M.D., JOHN H. FOUNTAIN, M.D., and DANIEL W. ZAHN, M.D.

Prevention of the development of recalcitrance is the logical beginning of practical management of tuberculous patients who fail to follow medical recommendations. Several steps can be taken to assist in lessening the uncooperative behavior of these patients.

Sanatorium Care

The first step in the prevention of recalcitrance is to have enough sanatorium beds available for the immediate care of all persons who have active tuberculosis. These beds should be located in reasonably attractive, conveniently located sanatoriums, staffed by competent and sympathetic personnel. To direct any great effort toward coercion of the uncooperative patient when there are cooperative patients awaiting hospitalization seems to be a questionable procedure.

Waiting lists for sanatorium care were abolished in Washington in 1948. As a result of building programs in Spokane, Yakima, and Tacoma, plus the acquisition of a surplus military hospital in Seattle, 2,400 beds, exclusive of those in Federal and mental institutions, are now available for the care of Washington tuberculosis patients. This number, divided by the 310 tuberculosis deaths of Washington residents (provisional data for 1951), establishes a ratio of 7.7 available beds per annual death. The average number of patients hospitalized in 1951 was 2,100—a ratio of 6.7 patients per annual death.

Patient Orientation

Adequate indoctrination of the patient prior to admission to a sanatorium is also fundamental. The physician who makes the diagnosis of tuberculosis and refers the patient for sanatorium care will need to take the time to explain skillfully and in simple language the significance of the patient's individual tuberculosis problem and the steps he must take both to get well and to protect his family and his community. The assistance of public health nurses and medical social workers is valuable to reinforce this preliminary indoctrination.

However, a physician cannot delegate his full responsibilities to his assistants. He himself must start the education of the patient. Following preliminary discussion of the medical facts by the patient and his physician, the clinician refers the patient to the medical social service department and the public health nurses

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for further help. The support of the family, the care of the children or of the farm, and many other problems are reviewed and careful plans are made to meet the various situations that will arise during sanatorium treatment.

In many areas in the United States, the financial eligibility provisions written into the tuberculosis control law are stumbling blocks to sanatorium placement. The Washington statute states simply that the arrangements for hospital care for tuberculous patients shall be the responsibility of the jurisdictional health officer, and this officer shall also have responsibility for determining the financial eligibility of patients admitted to tuberculosis hospitals. Since no standards for admission are written into the law, the health officer may concentrate on the epidemiological implications of the case rather than consider primarily the fiscal aspects. In other words, tuberculosis hospitalization becomes a part of a communicable disease control program rather than a component of medical care for the indigent. To the best of our knowledge, no tuberculosis patient needing sanatorium care in our State is staying at home because of financial obstacles.

Prevention in the Sanatorium

The next step in preventing the development of uncooperative patients takes place in the sanatorium. An interested, sympathetic medical staff, sufficient in number, is necessary. At Firland Sanatorium, Seattle, there is a staff of 19 full-time physicians to serve the 1,058 patients now in residence—55 resident patients per physician. This number of physicians is exclusive of interns, residents, pathologists, surgeons, or of the many part-time consultants. The medical staff is supplemented by five auxiliary services: education, occupational therapy, recreation, vocational guidance, and medical social service.

Irregular Discharges

In spite of adequate facilities for their care, many tuberculous patients refuse to enter the sanatorium, and a considerable number of those who do enter become irregular discharges (against medical advice, absent without leave, disciplinary). At Firland these irregular discharges constituted 47 percent of all discharges (exclusive of deaths) in 1948; 44 percent in 1950; 37 percent in 1951; and 36 percent the first 4 months of 1952.

In 1949 Drolet and Porter (*1*) reported a detailed study of patients discharged in 1947 from tuberculosis institutions serving the New York metropolitan area. Of 1,413 discharges (deaths excluded), 731 (52 percent) were irregular. Apparently, this problem is severe in other seaport cities besides Seattle.

Analysis of the irregularly discharged patients at Firland Sanatorium in 1950 shows that 29 percent were alcoholics, 8 percent had obvious psychiatric difficulties, and 9 percent had records of jail sentences. In spite of the availability of adequate sanatorium care, slightly more than one-third of the discharges (other than patients who died) have been without medical approval. The magnitude of the problem has been recognized by health authorities, and some steps have been taken to reduce it.

Legal Authority

The first step was to strengthen the authority of the health officer in handling the uncooperative patient with communicable tuberculosis. The Washington law (Remington's Revised Statutes, sec. 6094, enacted in 1903) states in part: ". . . Every health officer shall have the power to remove to and restrain in a pesthouse or isolation hospital, or to quarantine or isolate, any person sick with any dangerous, contagious, or infectious disease until such sick person shall have thoroughly recovered."

To define the power of the health officer further, on December 4, 1948, the Washington State Board of Health adopted the following regulation on pulmonary tuberculosis:

> *Isolation.* Of such active cases as do not observe the precautions to prevent the spread of the disease. The place of isolation to be in such quarters as designated appropriate by the jurisdictional health officer, and for such time as necessary until one of the following conditions is fulfilled: (1) The patient's pulmonary disease is considered to be "apparently arrested" (National Tuberculosis Association Classification—1940); (2) the patient agrees to accept routine sanatorium care; (3) the patient dies; (4) other arrangements for adequate isolation are made, which,

in the opinion of the jurisdictional health officer, protect the public from the spread of his infection.

Quarantine. Whenever, in the opinion of the jurisdictional health officer, he deems it necessary in the interest of the protection of the public, in uncooperative cases who refuse to observe precautions recognized as necessary to prevent the spread of this disease, quarantine procedures should be employed in accordance with the provisions under "isolation."

The deputy prosecuting attorney of King County was exceedingly helpful in specifying to the health officer the exact steps to be followed to conform to the principles of sound legal procedure. The first isolation order was issued by the King County Health Department on October 7, 1948; the first court order of commitment in King County for violation of an isolation order was issued February 4, 1949.

Locked Ward

As the compulsory isolation procedure was applied, it became apparent that a locked ward was necessary to handle the difficult individuals at Firland. Such a ward, of 27 beds, was made available at the sanatorium June 21, 1949.

The usual practice has been to keep the patient in the locked ward for 2 weeks after admission, and then transfer him to the regular wards of the hospital, the length of his stay there to depend on good behavior. If he disregards the institutional rules, gets drunk, or leaves the sanatorium, he is subject to reassignment to the locked ward for a longer time. Because of the admission of a few intractable patients, several of whom tried to set the ward on fire, experienced officials of the Seattle city police and fire departments were consulted. These officials helped to promulgate security regulations for safer operation of the locked ward.

Once the locked ward had been established and the procedure for its use simplified, the number of patients under isolation order increased markedly. As of May 15, 1952, there were 118 persons at Firland under isolation order, 12 in the locked ward and 106 in regular wards with the same privileges as other patients, except that if they violate hospital rules or run away, back to the locked ward they go. Men patients requiring isolation predominate in the ratio of 5 to 1. Four other sanatoriums in Washington have set up locked wards varying in size from two to nine beds.

As the result of having adequate sanatorium facilities available, many of the small and medium-sized counties do not have one case of active tuberculosis known to the local health department in which the patient is staying at home against the recommendation of the health officer.

Emotional Problems

It was apparent by 1948 that many of the patients who were irregularly discharged had emotional problems of varying intensity, some of them frank psychoses. The development of the auxiliary services—education, occupational therapy, recreation, vocational guidance, and medical social service—is a constructive step forward. These services are helpful in creating a successful adjustment to sanatorium life for many patients.

However, they are not enough. There remains a group of patients unable or unwilling to comprehend the benefits of the sanatorium care provided for them. We have undertaken several services in an attempt to meet these needs. One of the first steps was the formation of a chapter of Alcoholics Anonymous, with regular meetings in the sanatorium. The first meeting was held September 20, 1950, and meetings have continued, with an average attendance of approximately 20 members.

We hope that the provision of psychiatric consultation may help to combat irregular discharges. In cooperation with the University of Washington Medical School, psychiatric consultation services were expanded in 1949. Based on 2 years of experience, the consulting psychiatrist has formed some ideas on the management of maladjusted sanatorium patients, among whom alcoholics predominate.

Participation in Alcoholics Anonymous is very useful for the patients with mild to moderate maladjustment and can successfully tide many of them through their period of rest regimen. For the severe alcoholic, psychotherapy is difficult and often hopeless. Compulsory isolation and segregation are necessary if the patient and his community are to be protected. Some psychiatrists have maintained

that this forcible isolation of recalcitrant tuberculous patients would create a group of bitter and highly antagonistic people. Our experience indicates that most of the patients isolated under compulsory quarantine have proved to be tractable and capable of being managed successfully, once they learn that they can be restrained successfully if they fail to cooperate.

One of the most valuable byproducts of the psychiatric consultation service is the education of the sanatorium medical staff on day-to-day evaluation and management of adjustment problems of patients. The value of this service cannot be overemphasized.

X-raying Jail Population

Edwards and Reisner (*2*) reported in 1940 on the value of X-raying the jail population in New York City. In Washington several partial surveys were done in jails and one fairly complete, continuous survey in the Spokane County jail, which is located close to the health department, where miniature film equipment was available.

An X-ray machine was installed in the county jail in Seattle in June 1951 for routine X-raying of prisoners on admission. The group having the largest number of active cases was made up of the prisoners being sent to the county farm for rehabilitation of alcoholics. Of the 510 prisoners in this group, 88 (17.2 percent) were found to have active tuberculosis.

Case-finding efforts in jails are very lucrative in terms of cases found per amount of money spent. However, they do make absolutely necessary the provision of a locked ward for the prisoners discovered to have active tuberculosis. A prisoner may be sent to the sanatorium while awaiting trial or, if he has been tried and found guilty, the judge may suspend sentence provided the prisoner goes to the sanatorium for treatment. If the security facilities of the sanatorium locked ward are not adequate, there are single rooms in the county jail and a tuberculosis ward in the State penitentiary at Walla Walla.

Management Possible

Much experience has been gained during the past 3 years concerning the recalcitrant tuberculosis patient and his management. Among the large number of recalcitrant individuals handled during this period, the Seattle City-King County Health Department has had to secure only 16 warrants for the arrest of individual patients. Only 12, plus 2 repeaters, have been tried in court; all others have been handled through health department isolation regulations. The last instance in which it was necessary to go to court was on January 17, 1951—manifestation of the fact that the local health department and the sanatorium are now "on top of the problem" and the group of individuals who are headstrong or distorted in their thinking can be handled successfully.

If the ultimate objective of wiping out tuberculosis is ever attained, it will be necessary for every metropolitan area to seek cases "on the other side of the tracks," and for every city to have a case-finding program in jails, prisons, and the flophouse district. In consequence it will be mandatory to set up in every city a facility for the detention of this type of patient. The epidemiological benefits will justify all the trouble; the expense is modest.

It is true that in the first 4 months of 1952 the irregular discharges still constituted 36 percent of all discharges (exclusive of deaths) from Firland. However, most of these patients were individuals who had progressed with their treatment to the point where they were ambulatory or semiambulatory, and merely left the sanatorium before fulfilling the recommended standard of 4 hours of work tolerance for 3 months. The health department usually rounds up fairly promptly patients who are sputum-positive and constitute a definite public health menace. These patients immediately return to the sanatorium or are sent back under a health department isolation order.

In King County (population 760,000), on May 20, 1952, three patients with active, communicable tuberculosis were known by the health department to be at home contrary to the wishes of the department. An additional 60 patients with communicable tuberculosis were at home, but their cooperation with the health department and their circumstances were such that they were not considered a public health menace. None was working and none had children at home.

Summary

1. The practical management of the recalcitrant tuberculous patient begins with prevention of uncooperative behavior. Especially important is sanatorium care that is adequate both quantitatively and qualitatively.

2. The more nearly complete the job of tuberculosis control becomes, the higher the percentage of patients who are difficult to manage.

3. To solve the problem of the recalcitrant tuberculous patient two things are needed: (*a*) adequate laws requiring isolation of the patient; (*b*) a place for forcible isolation, preferably where treatment can be given.

4. Of the 1,058 patients now at Firland Sanatorium in Seattle, Wash., 118 (11 percent) are under isolation order. Forcible isolation of these patients has not developed a group of bitter, antagonistic individuals; most of them become tractable and readily manageable.

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Rabies Conference

The South Middle Atlantic Regional Rabies Conference, attended by delegates from Pennsylvania, Ohio, Maryland, Delaware, Virginia, West Virginia, Tennessee, Kentucky, North Carolina, South Carolina, Georgia, and the District of Columbia, was held June 2–3 in Washington, D. C. Among the recommendations made were these: Each State should establish a rabies control program to be carried out through a committee composed of representatives from State agencies; provisions should be made for exchange of rabies control information between States; and each State should arrange for the prompt reporting of rabies cases in all animals.

The conference, called by the Public Health Service staff of the Region III office of the Federal Security Agency and co-sponsored by the Fish and Wildlife Service of the Interior Department and the Bureau of Animal Industry of the Department of Agriculture, stressed the need for dog immunization clinics and for the control of stray dogs. It called attention to the increase of rabies in the wildlife in this area, particularly in foxes and skunks, and the increased dangers of infection in cattle and such domestic animals as cats and dogs.

An Eastern Regional Rabies Council, a continuing body representing the States which took part in the conference, was established to develop plans and procedures to put the recommendations into effect.

Swimming Pool Classification Program In West Virginia

By ROBERT S. JACOBSON, B.S.

The division of sanitary engineering of the West Virginia State Department of Health is now completing the second year of work on a proposed system of swimming pool classification. The trial program, started in the summer of 1950 and continued in 1951 with only minor changes, will continue during 1952. Personnel limitations, Government building restrictions, and material shortages have prevented the program from being established as rapidly as was originally planned.

For the past 25 years, it has been a requirement in West Virginia that all new pool construction be approved by the State health department, and compliance with this requirement has resulted in reasonably good installations. The State health department has also made it a practice to visit some of the pools during the year, and, through the cooperation of sanitarians from local health departments, to have more or less regular bacteriological sampling of the majority of the pools. Although this irregular coverage was of considerable benefit, many substandard pools continued in operation. The less desirable pools were generally quite old, dating back as far as 40 years. But it was not uncommon to find newer pools, constructed according to present standards, which had deteriorated through poor operation and maintenance. The swimming pool classification program was undertaken to eliminate the substandard pools by rehabilitation or closure.

Mr. Jacobson is assistant engineer of the division of sanitary engineering, West Virginia Department of Health, Charleston. He presented this paper at the twenty-first annual meeting of the Southern Branch of the American Public Health Association, Baltimore, Md., April 17, 1952.

Procedures

Trained sanitarians from local health departments, serving 50 of the 55 counties in West Virginia, are responsible for providing the following on pools in their areas:

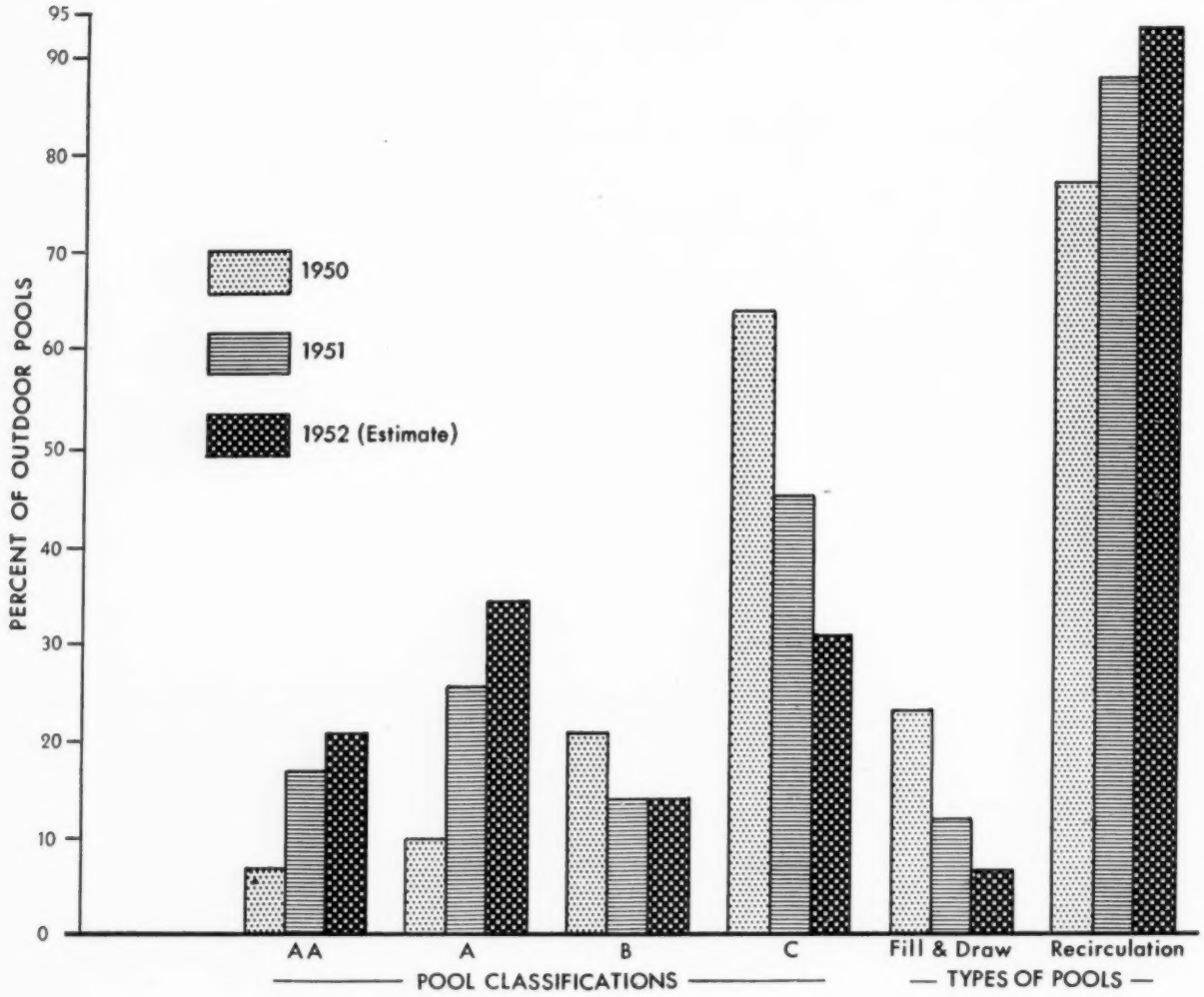
1. Outdoor pools: Each week while the pool is in operation, one bacteriological sample is taken; and free and combined chlorine residual, pH, and water clarity readings are recorded on a bacteriological survey sheet.

2. Indoor pools: Reporting is the same as for outdoor pools except inspections are made monthly and two bacteriological samples, one from the deep end of the pool and one from the shallow end, are provided.

All bacteriological samples are taken at a time when the pool has a substantial bather load and at the point or points of poorest chlorine distribution and the points of highest bather load, or both. The clarity standard is a 6-inch black disk on a white background, placed at the deepest point in the pool and observed from 10 yards. If the disk is clearly seen, water clarity is classified as "good," if dimly seen, "fair," and if not seen, "poor."

This information is submitted immediately to the State health department, where it is recorded. It is then returned to the sanitarians

Figure 1. Distribution of swimming pools according to classification and type, 1950–52.



along with the results of the bacteriological samples.

An engineer from the State health department's division of sanitary engineering visits each pool at least once a year—outdoor pools during the month of June and indoor pools prior to January 1. He inspects the pool, with the help of the local sanitarian, and scores it, using the Swimming Pool Classification Schedule. This schedule provides for scoring of pool construction, dressing room conditions, water treatment facilities, bacteriological count, and operation practices. It lists maximum points, indicating satisfactory attainment, for each item and subitem. The scores determine classification of the pools as AA, A, B, or C.

This classification program is patterned after a program developed by R. G. McCall of the University of North Carolina. The standards used are based on the report on "Swimming Pools and Other Bathing Places," published jointly by the American Public Health Association and the Conference of State Sanitary Engineers. Minimum construction and operation requirements include the following:

1. Pool construction: Required to be of impervious, smooth material; overflow gutters around periphery of pool with drains at 15-foot intervals; sufficient inlets and outlets to produce uniform circulation, maintain chlorine residuals, and eliminate dead spots; depth proportions sufficient to provide adequate area under 5 feet and adequate depth at diving end; fence or barrier around pool area; ladders for exit from pool; and proper depth markings.

2. Dressing rooms: Located conveniently to

pool with entrances at shallow end and access to pool only after passing through a shower; one shower per 40 bathers expected at time of maximum load; and one toilet per 40 women and one toilet plus one urinal per 60 men.

3. Water treatment: Turnover, with filters, every 8 hours or less; constant head orifice or positive displacement pump-type chemical feeders for alum and soda ash; positive feed chlorinator and control kit; indicator to show rate of filtration and backwash; wash water visibility; hair and lint catchers; suction cleaner; loss of head gauges; and absence of cross connections with city water supply.

4. Operation: Chlorine residual at least 0.3 ppm free available chlorine or 0.8 ppm combined chlorine; pH between 7.0 and 7.6; water clarity as indicated above; no sediment or slime on pool bottom; inspection of bathers prior to entering the pool for cleanliness, respiratory infections, open cuts or sores; and adequate lifeguards and first aid equipment.

The active participation of the local sanitarian in this program is an essential requirement for its success. Out of a possible total of 100 points, about half (47) are based on information submitted by him.

Thus far pool grades are available only to the pool owner and the local health department. It is intended, however, that, when the program becomes a State health department regulation, grades shall be announced publicly—on July 1 for outdoor pools and on January 1 for indoor

Figure 2. Relationship between bacteriological quality of pool water and chlorine residuals.

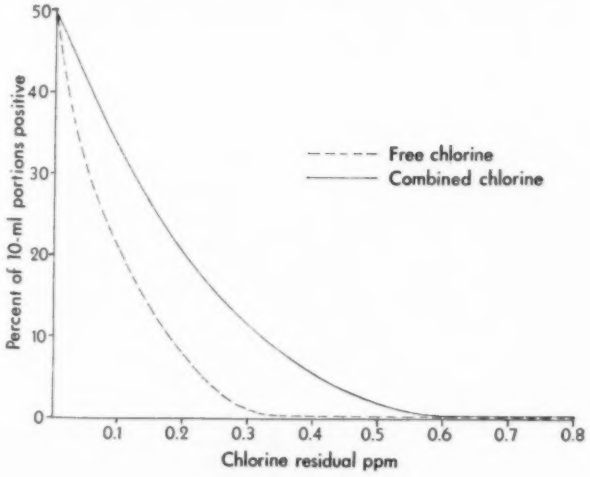
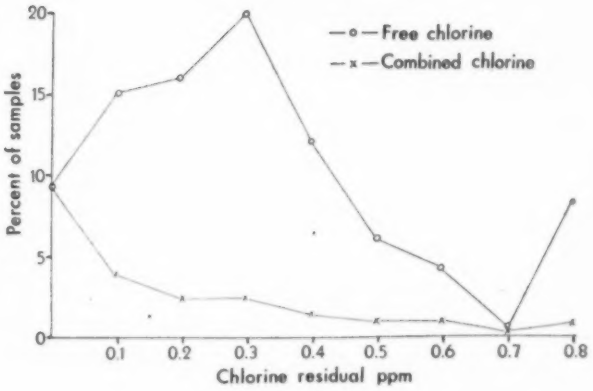


Figure 3. Distribution of samples according to chlorine residuals.



pools. A continuous record will be kept on each pool from the information submitted by the local sanitarian, and when this information indicates a change of classification, the change will be made and publicly announced. It is also planned that operating permits will not be issued to pools classified as C. At present, public opinion is the chief "wedge" for improvement, although the State health department can and does close dangerous public pools.

Prior to the outdoor swimming pool season of 1951, four 1-day swimming pool clinics were held at various locations in the State. These clinics were well attended, and it was generally agreed that they were of help to pool operators and owners. Included among topics discussed were: modern recirculation equipment; good swimming pool housekeeping; chemical treatment and control; swimming pool paint and resurfacing material; and the pool classification program.

Results

A great deal of improvement has been made in practically all swimming pools in the State, and the interest and cooperation of the pool owners and operators have been very good.

Figure 1 illustrates graphically the improvement made in outdoor pools. During the 2-year period (not including 1952), 48 percent of the fill and draw pools have been converted to the recirculation type. The number of Class AA and Class A pools has increased 39 percent, and the number of Class C pools has decreased 29 percent.

It has long been established that free chlorine is a much better disinfecting agent than combined chlorine. A comparison of the effects of these two agents on the bacteriological quality of pool water substantiated this point (fig. 2). The data for this analysis were based on 819 samples of pool water (4,095 10-ml. portions) and 819 chlorine residual readings, submitted by the local sanitarians.

In interpreting figure 2, consideration should be given to the data in figure 3, which show that a comparatively small number of samples was submitted for high combined-chlorine residual readings. This portion of the curve in figure 2, therefore, is not as accurate as the rest. However, it should be pointed out that since no pools in West Virginia use chlorine-ammonia treatment, samples containing combined chlorine at concentrations of 0.5 and above probably contained some free chlorine. Furthermore, although uniform instructions were issued to all sanitarians on the methods by which free and combined chlorine should be determined, it is reasonable to assume that these instructions were misinterpreted by a few.

Summary and Conclusions

After 2 years of experience in operating a swimming pool classification program on a trial basis, the West Virginia State Department of Health reports the following results and conclusions:

1. The interest and cooperation of the local sanitarian are necessary to the success of the program.

2. Free chlorine has been verified as a better disinfecting agent than combined chlorine.

3. The number of fill and draw pools has been reduced 48 percent.

4. The number of Class AA and Class A pools has been increased 39 percent.

5. The number of Class C pools has decreased 29 percent.

6. The interest and cooperation of pool owners and operators have been very good.

7. The results obtained indicate that the program is worth while, and it is planned to continue it within the limits of existing facilities.

PHS films

Onchocerciasis: The Blinding Filariasis

16 mm., sound, color, 17 minutes. 1951.

Audience: **Physicians, medical students, specialists in tropical medicine.**

Available: **Loan—Apply Public Inquiries Branch, Public Health Service, Federal Security Agency, Washington 25, D. C. Purchase—To be arranged through Castle Film Division, United World Films, 1445 Park Avenue, New York 29, N. Y.**

Serving both as a graphic introduction to onchocerciasis and as an interesting documentation of an epidemiological approach to the study of this important tropical disease, this film was produced jointly by the Laboratory of Tropical Diseases, National Institutes of Health and the Pan American Sanitary Bureau.

It is divided into five main sections: etiology, epidemiology, clinical manifestations, diagnosis, and treatment.

The etiology section details the clinical and laboratory investigative techniques used, including biopsy sampling, microscopic and photomicrographic observation, and microgross examination of the Simuliidae. The epidemiology section documents the fly habits, larvae, pupae and adult stages, and collection-identification methods by dye powder coloring. The section on clinical manifestations elaborates on the chronic aspects of the disease and discusses, by means of the perimeter and corneal microscope, the conditions of photophobia, conjunctival pigmentation, atrophy of the iris, and visual acuity. The diagnosis section includes biopsy and microscopic examination, particularly the characteristic protein reaction induced by oil of hetrazan. Surgical methods and methods of medication involving suramin sodium compounds, such as germanin, bayer 205, and antrypol, are portrayed in the treatment section.

The majority of the footage of the film was taken by Dr. Thomas A. Burch, in the Yepocapa area of Guatemala.

Environmental Health Needs In a Dynamic Society

By MARK D. HOLLIS, C.E.

When we speak of a healthful environment, we think mainly of safe, wholesome, palatable water, of a healthful diet, of clean air, and of shelter for our families where they live, and work, and rest.

The need for a healthful environment is common to all peoples: it cuts across boundaries of occupation, race, class, and politics. If it differs from neighborhood to neighborhood, and from region to region, it differs not in fundamentals but only in complexity.

Today, our Nation's needs for environmental health services are the most complex in history because of the environmental changes created by economic and technological advances. The job today for environmental services is to keep up with, or ahead of, total historical trends.

If we do not keep ahead of some of these changes, we may be obligated to suffer them indefinitely. Already we are dangerously behind the trend in water pollution. In communities like Los Angeles, will people continue to suffer from polluted air?

Are we committed to live with a scandalous number of home and highway casualties?

Are we endangering future generations by our increasing exposure to ionizing radiations?

We have come a long way since Benjamin Rush attacked filth in Philadelphia. A century ago, we were obliged to advance the techniques of sanitation by a trial and error process. Shortly thereafter scientific studies began the identification of microbes, leading to the modern life-saving techniques of pasteurization and chlorination. Since then, also, teams of health workers have organized effective attacks upon a host of disease vectors. Equally significant studies prepared the ground for the chemical approach to nutrition.

Today, the Nation aims to carry on what has been begun so well. Also, we are beginning to explore relatively new worlds: the viruses, fungi, and pollens; the effects of noise, radiations, dusts, temperature, humidity, and other physical forces; the environmental needs of an aging population; nutritional and other environmental factors in chronic disease; methods for reducing the appalling toll of home accidents; and the biological effects of penetration of the environment by commercial chemicals.

The feed-back process creates new problems as rapidly as old ones are solved. The chemicals used to control vectors, for example, may themselves become environmental hazards. Radiations used to sterilize sealed foods, an imminent development, may themselves be hazards in the working environment.

The outstanding historical trend is the increasing rapidity and continuing complexity of environmental change. Though we may realize that industrial production has increased sevenfold since 1900, it is difficult to sense the significance of the fact that half of this increase has come within the past 10 years. The speed of progressive technology has tossed us far out onto uncharted waters. From here on, we travel without precedent. We must review our

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health programs constantly and adjust them frequently to keep in pace with the times.

Our Resources

Our 300-billion-dollar productive capacity assures the ability to provide essential environmental services. We have the material resources, the knowledge, and the techniques with which to train personnel. We have also a respectable body of capital equipment for water and sewerage systems, for food processing, for shelter of all kinds, and for laboratory experiments. Public water supply systems serve more than half the population, and they serve 90 percent of the families in the areas where they are installed. About 90 percent of fluid milk on the market is pasteurized. Even though specific deficiencies remain, we have unquestionably the greatest per capita investment in the world in a healthful environment.

Our institutional resources are equally valuable. With the collaboration of private institutions, we have formed the core of a successful team of Federal, State, and local public health agencies. The present pattern of administering public health programs assures flexibility and opportunity to experiment and to diversify. At the same time, it makes possible the development and use of uniform standards, equipment, or methods, once the advantages of uniformity are fully realized.

Health departments, to be sure, have not engaged directly in every field of environmental health service: often services are managed as commercial or mechanical functions and sometimes with little regard for their relationship to public health.

Current Needs

Our paramount need is to recognize that a healthful environment is a basic social objective. Such recognition should be established not only among professionals but also among the general public. It is not merely a matter of securing funds to support health work. Funds now available are not always spent as well as they should be—where there is no appreciation of prime health objectives.

Where health is a major objective, money can be used to anticipate future health problems. It is not necessary to delay action until there is a clear and present danger. Professional health workers usually know the need for environmental services years before public opinion and public officials support such services.

Widespread recognition of health objectives may also help to extend participation in health activities to persons outside the public health profession. Environmental health services have grown so complex that they can no longer be managed exclusively by a handful of public health employees—a mere 8,500 engaged in sanitation work in all State and city health departments. Active collaboration must come from physicians, engineers, farmers, food handlers, builders, and city planners, to name but a few of the professions and trades concerned.

Traditionally, health work has been negative: it has aimed to prevent disease rather than to promote health.

We are in a position today to conceive of health in positive terms. We can define healthful living conditions, and we can work toward such conditions.

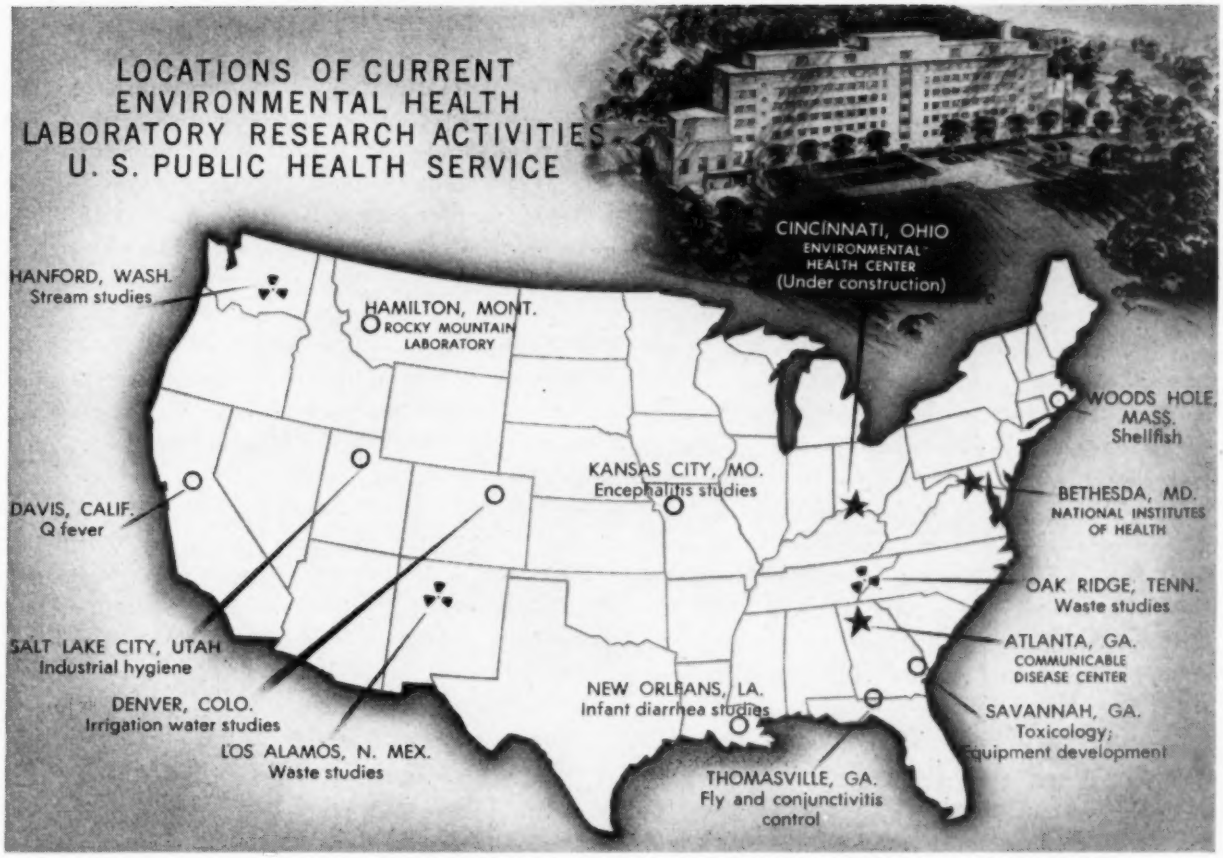
For example, it would have been good engineering and good economics, too, if we had worked as hard to secure and protect clean raw water as we have worked to treat polluted water. The positive concept applies to housing, dental health, and to other fields. The positive concept of health may be the decisive difference between environmental health work as we have known it and as we may see it in the future.

As we consider specific fields for positive action—air, water, food, and shelter—it would seem we have two simultaneous tasks. One is to increase progress in established fields. The other is to probe the unknown, to probe new problems, and to develop new instruments and new tactics.

In recent years, there has been a tendency for environmental services to remain static. This tendency results partly from the hypnotic effects of routine, partly from the failure to value these public health services as highly as personal health services, especially for certain chronic diseases, and partly from indifference to obsolescence of practices and equipment.

Air

Although, pound for pound, our intake of air is 10 times as much as our intake of water, the



—From "Environment and Health," Public Health Service Publication No. 84, 1951.

atmosphere is one of the relatively neglected fields of public health. Presumably, different atmospheric standards would apply to the kitchen, laundry, and nursery; to the school and the factory; to the city and the country. But we don't know what they should be. Meanwhile, we have observed the discomfort of 4 million victims of hay fever; the chronic irritation in Los Angeles; the deaths, notably among the aged, in Donora; and specific lung diseases, such as silicosis and lung cancer, in certain industrial areas. We have seen that a polluted atmosphere attacks not only the lungs but also the skin and eyes. Atmospheric chemicals enter the blood stream also and produce secondary organic effects.

In this field, there is a need for more and better standards; legislation and administrative organization; a better knowledge of the contents of the atmosphere, of the techniques of regulating atmospheric conditions, and of the chronic effects of low-level exposure to impurities. What all this will cost, no one can say, but it is not likely to cost as much as the present losses that result from dust, corrosion, illness, and other effects of atmospheric pollution.

There is need also to strengthen determination to act in the presence of alarming changes in the natural environment before all the evidence is in. This policy is needed to deal with radioactive dusts and with germs or poison gases which may enter the air, whether by accident or design, as well as with the more familiar hazards. We can't afford to postpone corrective action until all scientific questions have been answered.

Water

Although the highest use of water in our society is to relieve thirst, its other uses are equally essential. For this reason, we have come to feel it has been a basic error to separate the need for a safe drinking water supply from the need to prevent gross pollution of the raw water source. The tendency today is to approach the development and utilization of

the water resource as a unit. Water is a factor in nutrition, dental health, waste disposal, shelter, atmospheric conditioning, radiation exposure, recreation, and in industrial production.

The need to maintain and extend basic water services is unrelenting. We should extend the public supply lines to the 10 percent of the population living in settled areas which are not now served. Seven million homes need to be supplied with running water. Water-carriage systems of waste disposal are needed in an even greater number of homes. Four million rural families need new or improved water sources.

There is need also to reclaim water in polluted sources; to abate pollution now entering streams, lakes, and harbors; to extend the practice of fluoridation; and to improve techniques for managing certain trade wastes. There is a need also to modernize techniques.

There is need to anticipate expanding demands and uses of water. The economy may be expected to grow at a rate of 3 percent a year. It is predicted that, by 1975, output will be double the level of production in 1950. The Census Bureau estimates a population of 193 million in 1975, with a working force of 82 million. The work week is expected to be 15 percent shorter. And labor productivity is expected to rise 2.5 percent annually. These figures all suggest increases in both the total and per capita level of consumption of goods and services.

The backlog of proposed water works construction projects is estimated at $1.4 billion. The backlog of sewerage projects proposed is put at $2.4 billion. This backlog does not contain all projects needed to anticipate future needs arising from the growth of population and production. A 10-year program of investment in treatment facilities for municipal and industrial wastes is estimated to run from $9 to $12 billion.

Food

Unless there is danger of infection or poisoning, it is usual to think of food as a commodity. Environmental services have applied to the food environment rather than to the food itself. But with the development of a positive view towards health, the tendency is to think of food less as a commodity and more as an essential to health. This tendency was accelerated by the experience of England during the war years. There the general level of nutrition was improved despite a decline in the total quantity of food available. American concern with the quality and quantity of diet and its availability began with isolation of the vitamins and with Goldberger's pellagra studies. The extent of malnutrition 20 years ago intensified this concern.

Economic developments since 1941 seem to have turned the tables: for Americans, the major food problem today seems to be obesity. Deficiency diseases—pellagra, beriberi, and rickets—have become relatively rare. But we still lack a sound index of where we stand on nutrition. The practice of adding vitamins to certain foods is a voluntary act by the processor.

Efforts to protect food from contamination have been aimed chiefly at certain organisms and their toxins. The need to apply such protection to public eating places is chronic. But we have little of the knowledge needed to control chemicals in food. The select committee of the House of Representatives to investigate the use of chemicals in food products (H. R. Res. 323, 81st Cong.) states there are 704 chemicals used in food, and only 428 are known to be safe. Some chemical additives, in appropriate amounts, are beneficial, as are fluorides, iodine, or vitamin D. But others may bear further investigation. A Federal food board has been suggested to rule on the safety of using chemical additives.

The need for uniform regulations, uniformly administered, has been noted particularly in the food industry. Fortunately, the milk industry and public authorities have developed a cooperative program which seems likely to facilitate the movement of milk across State lines. Uniformity is expected also to achieve major economies in the design, manufacture, and use of equipment.

Shelter

Our concept of shelter was once limited to a roof and four walls, but this concept has broadened to the belief that environmental services focus upon the health of the family in the home, and that the safeguards applied at the

water works, the factory, the school, the office, or the dairy are simply extensions of the family roof.

In practice, decent shelter provides a potable supply of water, sanitary disposal of sewage and garbage, healthful atmosphere and temperature, and good lighting; quiet and privacy; enough space for safe movement, for storage, and for play; screening and other protection against pests or disease carriers; safe, fireproof design and construction; and reasonable access to community facilities in an orderly neighborhood. These are rough specifications of what is meant by the national housing policy approved by Congress, stating that "the health of the people . . . requires a decent home and a suitable living environment . . . for each American family"—(Public Law 171, 81st Cong., 1st sess.).

Despite this policy, and despite a prodigious record of building in the past 5 years, one-third of the Nation's dwellings today have one or more basic health defects. As noted above, 7 million dwellings lack running water. Only half of these are in farm areas. Another 7 million lack hot running water. Almost 7 million dwellings are overcrowded. Almost 13 million dwellings lack decent toilet facilities, and only a third of these are in farm areas. More than 12 million have no shower or bathtub, and less than half of these are on farms.

Before the discovery of microbes, health departments actively enforced minimum standards of health and sanitation in housing, because they recognized that these were their best defenses against disease. A short-sighted notion that germs could be controlled without sanitation tended to discourage this activity. Another reaction against sanitation occurred as a result of the use of DDT and other chemicals. A few enthusiasts began to think that disease-carriers could be controlled chemically without sanitation measures. They have since learned that they were wrong.

The current housing shortage has encouraged progressive health departments to apply enforcement measures to improve the supply of decent shelter. Baltimore, Los Angeles, and Milwaukee are among more than 40 cities with programs under way. Health departments in at least 40 other cities have initiated programs. Such programs could add 500,000 decent units a year to the present supply for over 30 years.

Builders and real estate operators are giving this movement their support. Public health officials, recognizing that private building and public housing cannot satisfy the total demand in all income brackets for decent homes, can contribute outstandingly to this one phase of the shelter problem. There is a need to apply the standards of decent shelter also to the facilities used by a million migrant workers and by other transients.

Personnel and Training

A review of personnel and training must consider that environmental services are not the private domain of a single profession exclusively. The health team has replaced the individual professional in health practice. But even in the team, we look to the individual leader. Leadership is given to the personality with the capacity and competence. It is not a professional monopoly.

The need for broad-gauge men and cooperative relations with those in related fields is indicated by our industrial growth. Our economic future depends upon the determination of industrial engineers and health workers to keep the byproducts of modern technology under control.

The emerging problem of ionizing radiations appears to be one mainly of organizing competence in local and State health departments. Their responsibilities in the atomic age are suggested by the growth of the facilities of the Atomic Energy Commission and the concomitant use of radiations in private industry. Health departments will soon require the knowledge and training to protect this generation, and future generations, from the consequences of excessive exposure. Meanwhile, there is a great need to establish programs to evaluate radiation exposure and to develop protective practices.

Research

To overemphasize the importance of broad, popular understanding of the environmental conditions fundamental to public health would be difficult. Perhaps the development of a broad understanding should be a phase of ad-

ministrative research. The key to this need may be that the man at the desk seldom takes the total health needs as seriously as he takes the water supply in his own kitchen. It is difficult to stir him with the fact that accidents in the home are the leading cause of death in children. Chronically, he takes the view that home accidents happen to somebody else, until they happen to him. There is a need to know how such a personal view of public health can be broadened.

Other research needs—the need for modern techniques of operation and management, and the need for modern procedures for evaluating health conditions and techniques—have been mentioned previously in relation to specific operations.

However, one relatively untouched but important field of research is the study of the relationship between health and total economic prosperity. On the one hand, we need to know what health services the economy can afford. On the other, we need to know how much environmental controls contribute to the expansion of the economy. It would be useful to know on what terms our resources could assure a decent home for every family. It would be useful also to measure the effects of health on the productivity of the working population or the cash advantage realized from industrial uses of water. Both industry and the public may benefit from such studies. With such knowledge, we may find it possible to raise health standards substantially.

For water pollution control particularly, there is a need for continuous, automatic monitoring instruments, such as we have developed for measuring radiations. New kinds of measuring instruments are needed too, because the character of pollution has changed in recent years. The development of these instruments obliges us to inquire whether the expense and complexity of the operation is justified, but generally any machine may be used in repetitive operations to advantage. There is a need to develop techniques for removal of specific pathogens from water and for removal of organic chemicals and radioactive substances. There is need for a major shift in emphasis from the simple disposal of waste material to its capture and conversion into useful commercial products. This need is the more urgent in view of the depletion of certain nonrenewable resources and the importance of organic fertilizers. This need will grow with time.

If it is agreed that environmental research seeks practical applications rather than basic knowledge, then it is important to evaluate both research and operations in terms of the ends we seek. Such evaluations would determine whether our efforts are meeting their objectives. They would provide a solid basis for planning. And they would tell us whether we are developing techniques and facilities to deal with predictable developments.

Summary

Environmental health services today need greater recognition to enable the Nation to adjust to the demands of a rapidly changing environment. Recognition may come if the public learns to associate personal needs in environmental services with the public need. Recognition may be improved also by open efforts to advance and extend familiar services, and to develop future services.

The four fundamentals of environment—air, water, food, and shelter—in the United States right now present a complex assembly of interrelated needs. In each field there are the recurrent needs of administration, personnel, research, and positive concepts.

To look ahead, it appears a certainty that our hopes and objectives for public health are bound to be integrated with public policy as a whole, our economic development, our role in world affairs, our social institutions, and our common hopes and aspirations.

The pessimists among us are convinced that society is about to enter a new eclipse of ignorance and darkness. The optimists are confident that the golden age is around the corner One must be a realist; one must recognize the complexities and difficulties of this period of transition and still endeavor that, with no problems completely resolved, we shall use our technical powers so that the next generation will still have grounds to feel confidence and pride in its health services. We have reason to hope that, within the next 20 years, the Nation need not suffer neglect of the environment of any family, any neighborhood, or any community.

A Coordinated Investigation *of a* Food Poisoning Outbreak

By FERDINAND A. KORFF, MATTHEW TABACK, A.M., and J. HOWARD BEARD, M.D., M.P.H.

The investigation of an outbreak of food poisoning near Baltimore in July 1951 demonstrates a statistical epidemiological procedure which, it is believed, will be of value in determining offending foods in the absence of laboratory analyses. The purpose of this type of investigation is to locate the focus of poisoning so that measures which will decrease the possibility of recurrence of the unfavorable incident may be applied.

Initial Report

On July 19, 1951, the bureau of food control, Baltimore City Health Department, learned from a friend of one of the victims that a number of office workers had become ill after attending a picnic the previous day. The picnic was sponsored by the employees of a local insurance company. The office manager of the company was therefore requested to complete the questionnaire used by the Baltimore City Health Department in investigating outbreaks of food poisoning. The following information was obtained.

On July 18, 1951, the office personnel of the insurance company held an "outing" at a semi-private resort approximately 30 miles from the city in an adjoining county of the State. Traveling by private automobile and public bus, 320 employees plus friends reached the resort at about 1 p. m. The day was cloudy, humid, and warm. Upon arrival, a number participated in bathing, horseshoe pitching, golfing, and playing soft ball. Exercise was normal, not too strenuous for such an occasion. Beer and pretzels were served constantly, "as much as desired." At about 6 p. m. a buffet style meal was served in an open casino. The food, displayed on tables and served by temporarily employed food handlers, was sliced cooked ham, recently fried crab cakes, potato salad, sliced tomatoes, heated baked beans, sliced bread, ice cream, cake, and hot coffee. Single-service containers only were used. Illness, principally nausea and vomiting, began about 2 hours after the food was eaten.

Field Investigation

On July 20, 1951, the county health officer investigated the resort food-handling procedure and interviewed the manager of the resort. It became readily apparent that the remainder of the food had been disposed of and that the manager was on guard so that the outbreak would not affect his future income from the resort. However, it was ascertained that the precooked ham, potatoes, and beans were purchased from a jobber nearby and delivered to the resort on the morning of the picnic. The crab meat in cans was stored in a standard

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family-sized electric refrigerator until the time of preparation. The tomatoes were procured the afternoon of the picnic from a wholesale vegetable supplier.

The management supplemented the regular staff of four cooks and waiters with nine extra helpers for the day. Food preparation began at 2 p. m. and was continued until serving at 6 p. m. The precooked ham, tomatoes, cake, and ice cream did not demand any special preparation.

The potato salad preparation began at 2 p. m. and continued until 4 p. m. This salad consisted of cut potatoes, saladaise, onions, peppers, pimento, celery seed, pickled relish, vinegar, salt, and pepper. The saladaise was procured in 1-gallon jars, which were kept in a basement storeroom until used. In the preparation of the salad a single gallon jar of saladaise had been used. The pickled relish was also purchased in 1-gallon jars which were kept in a basement storeroom until used. All other ingredients were either fresh or kept on hand as standard season products in the usual commercial containers. The cook used his hands to mix the salad ingredients. There is every reason to believe that he did not wash his hands before preparing the salad, although neither the manager nor the cook would confirm this statement. After preparation, the salad was covered with waxed paper and left on the work table until serving time.

Table 1. Distribution of persons in attendance according to age, sex, and presence of illness

Age and sex	Total	Ill	Not ill	Percent ill
All ages	304	146	158	48
Male	101	42	59	42
Female	203	104	99	51
15–24 years	115	58	57	50
Male	18	7	11	39
Female	97	51	46	53
25–44 years	56	19	37	34
Male	32	12	20	38
Female	24	7	17	29
45 years and over	28	17	11	61
Male	17	10	7	59
Female	11	7	4	64
Age not stated	105	52	53	49
Male	34	13	21	38
Female	71	39	32	54

Table 2. Distribution of ill persons according to time of onset of symptoms

Interval between consumption of food and onset of symptoms (hours)	Number reporting ill
Total	146
Less than 1	1
1–2	3
3–4	48
5–6	59
7–8	17
9–10	1
11–12	11
13–14	4
15 and over	2

The crab meat in cans was delivered to the kitchen at noon of July 18, and the cook immediately began to prepare the crab cake patties, which consisted of bread crumbs, Worcestershire and Tabasco sauce, parsley, and pimentos, in addition to the crab meat. The patties were placed on large fryers and fried in deep fat at approximately 350° F. Before heating, the patties and ingredients were handled by the cook. The crab cakes were ready for serving about 5 p. m.

At approximately 5:30 p. m. the crab cakes, potato salad, baked beans, coffee, sliced ham, sliced tomatoes, sliced bread, squares of cake, ice cream in dry ice containers, paper napkins, individual cups, spoons, forks, and plates were transported in an open truck from the kitchen to the picnic area. The food was placed on long tables and served by the waiters to the line of guests, beginning at 6 p. m. Some of the party continued to have "seconds" until about 10 p. m., at which time the service was discontinued. After the remaining food was removed from the picnic area to the kitchen, it was given to the extra helpers to eat and to take home. The manager stated that not a single case of illness developed among the persons who consumed the food "leftovers." This statement had to be accepted as true.

The inspection of the kitchen revealed that general sanitation was "fair." The most sig-

nificant findings were: (*a*) improper cleaning of the meat grinder, resulting in residual putrified meat on the parts; (*b*) 70° F. temperature in one of the two family-size iceboxes; (*c*) cracked work-table top; (*d*) no three-compartment sink for cleaning and disinfecting equipment; (*e*) glasses standing on shelves; (*f*) no facilities for handling kitchen working utensils; (*g*) no easily available hand-washing facilities. The general condition of work tables and butcher tables indicated the need for better equipment.

The water used was procured by electric pumps from a 90-foot driven well. For the last few years it has been of acceptable quality. A bacteriological analysis of the water taken on June 11, 1951, was negative for coliform organisms.

From the questionnaire information, 146 persons stated that they had become ill. The total number of persons fed, according to the manager of the resort, was 332.

Statistical Analysis of Food Histories

Questionnaires initiated by the bureau of food control and completed by persons attending the picnic provided information on 304 individuals. To facilitate analysis, punch cards were prepared for each person providing a food history.

The statistical analysis of the data obtained through the questionnaire was designed to indicate which segments of the group attending the picnic were selected for attack by gastrointestinal disease.

A description of the individuals attending the picnic, according to age and sex, is shown in table 1. The attack rate among females was significantly higher than that for males,

Table 3. Attack rates according to food consumed

Food consumed	Total eating	Number ill	Number not ill	Percent ill
Ham	230	108	122	47
Crab cake	235	124	111	53
Potato salad	246	142	104	58
Tomatoes	253	127	126	50
Ice cream	201	98	103	49
Beans	258	129	129	50

Table 4. Attack rates for specified food combinations

Food combination	Total eating	Number ill	Number not ill	Percent ill
Ham	230	108	122	47
With potato salad	189	106	83	56
Without potato salad	41	2	39	5
Crab cake	235	124	111	53
With potato salad	200	120	80	60
Without potato salad	35	4	31	11
Potato salad	246	142	104	58
Without ham	57	36	21	63
Without crab cake	46	22	24	48
Without ham or crab cake	103	58	45	56

although the difference, approximately 10 percent, was not striking. Differences are noted among the age groups, but here also it is apparent that the attack of all groups at a high rate is of more significance than the differentials.

A distribution of the individuals who were attacked, according to time between eating the food and onset of symptoms, is shown in table 2. The median time of onset was 5.2 hours, with 85 percent of all cases occurring from 3 to 8 hours following consumption of food. The outbreak of gastrointestinal disease appeared therefore to be associated with a single focus of exposure.

The manner in which individuals in attendance were attacked, according to their food histories, is given in table 3. The highest attack rate occurred among persons eating potato salad. However, relatively high rates also occurred for each of the other foods. The baked beans, tomatoes, and ice cream, however, could be considered as not being the cause of the illnesses. The beans were recently cooked and served hot; the ice cream was pasteurized under supervision and consumed by many persons who did not attend the picnic; and the tomatoes, unless contaminated by a chemical, could not be the cause of the illnesses. The severity as well as the timing of the illness did not indicate that it was caused by a contaminating chemical. The search for the offending

food was therefore narrowed down to the ham, crab cakes, or potato salad.

In view of the fact that the individuals attending the picnic had eaten several foods, it was thought that high rates of all suspect foods were the result of their close association with one another so far as their consumption was concerned. In order to determine the specific effect of a single food, a series of attack rates for combinations was undertaken (table 4). In the absence of potato salad, the attack rates associated with crab cake and ham became relatively insignificant. The attack rate for potato salad, however, remained high whether or not the salad was associated with other foods. Thus, high attack rates were associated specifically with the consumption of potato salad.

This method of determining attack rates for various food combinations is not too often possible because the number of individuals from whom detailed data can be secured in conjunction with a food poisoning incident is usually small. An alternative procedure commonly employed is the comparison of attack rates for persons consuming particular foods with attack rates for persons not consuming the specified foods. This type of analysis is shown in table 5.

Statistically significant differences in attack rates are obtained only for potato salad and crab cake. In the remaining cases, the attack rates seem to be independent of the consumption of the given foodstuffs. This type of analysis, although usually capable of providing a clear-cut inference concerning a source of food infection, only narrows down the possibilities in this incident. The information in table 4 furnishes the final solution to the specific vehicle of infection.

Table 6. Distribution of ill persons according to time of onset and symptoms of disease

Time interval (hours)	Emesis with or without diarrhea	Diarrhea only	Total
Total	120	26	146
1			
2	3		3
3	11	2	13
4	31	4	35
5	30	2	32
6	23	4	27
7	13		13
8	2	2	4
10	1		1
11	6	12	18

An explanation of the manner in which potato salad could have caused the illnesses may be developed from a study of the distribution of time of onset of symptoms, shown in table 6, and from the information obtained by the health officer during his investigation.

The only food of the three suspected ones that was handled with the bare hands and eaten without subsequent heat treatment was the potato salad. The deep-fat frying procedure used in the preparation of the crab cakes requires the fat to be above 300° F., which is sufficient to destroy any thermo-stable staphylococcic enterotoxin that may have been present. Ham usually becomes infected only in spots. The salad, with less solid consistency, maintained at a temperature of about 70° F. and prepared about 4 hours prior to serving, provided ample opportunity for infection, growth of the organism, and formation of the enterotoxin. The time of onset of the illness, 3 to 8 hours after consumption of the food, and the symptoms, chiefly emesis, indicate poisoning by an entero-

Table 5. Attack rates for specified foods according to history of consumption

Type of foodstuff	Total eating	Incidence of illness		Total not eating	Incidence of illness	
		Number	Percent		Number	Percent
Ham	230	108	47	74	38	51
Crab cake	235	124	53	69	22	32
Potato salad	246	142	58	58	4	7
Tomatoes	253	127	50	51	19	37
Ice cream	201	98	49	103	48	47
Beans	258	129	50	46	17	37

toxin produced by a staphyloccocus. This time of onset and emesis are not indicative of botulism, salmonellosis, or parasitic infection, and poisoning by an inorganic chemical usually causes emesis within a shorter period.

Summary

Although statistical classification is used in this study as the primary instrument for uncovering causal sequences, a certain amount of past experience is also used. It is known that certain foods are unlikely to be responsible for outbreaks in which the symptoms and times of onset of the illness appear to have been caused by a staphylococcic enterotoxin. Ice cream made by a plant known to pasteurize its product adequately, tomatoes, bread, cake, and coffee are very unlikely to support the growth of the staphylococcus in quantities sufficient to cause the symptoms experienced by those who became ill. The symptoms of the illnesses also probably eliminate a chemical as the cause. Concentration of search, therefore, was pointed to the ham, crab cakes, and potato salad. By determination of attack rates, which are specific for given foods and combinations of foods, a single focus, potato salad, was isolated as the probable cause of illness.

Radioactive Cortisone To Be Manufactured

Radioactive cortisone, which should prove valuable in the study of arthritis and the various metabolic diseases involving adrenal gland hormones, will soon be manufactured in sufficient quantities for research purposes. Funds for this project will be supplied by the National Institute of Arthritis and Metabolic Diseases, Public Health Service.

This cortisone contains radioactive carbon which makes it possible to trace it through the bodies of experimental animals. Such tracer studies may help solve the mystery of how cortisone acts to produce its dramatic effects in health and disease.

A small committee of scientists from non-Federal research institutions will administer the $66,000 fund allotted for the project. Headed by Dr. Charles Huggins of the University of Chicago, this group will plan the project, bring together the starting materials, and contract with a suitable manufacturer. The product will be distributed to qualified scientists who submit formal research proposals to the National Institute of Arthritis and Metabolic Diseases.

Milk Sanitation Honor Roll for 1950–52

Forty-eight communities have been added to the Public Health Service "honor roll" of safe milk communities, and 42 communities on the previous list have been dropped. This revision covers the period from July 1, 1950, to June 30, 1952, and includes a total of 258 cities and counties.

Communities on the "honor roll" have complied substantially with the various items of sanitation required by the Milk Ordinance and Code—1952 Recommendations, of the Public Health Service. The State milk sanitation authorities concerned must report this compliance to the Public Health Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk is pasteurized and for those in which both raw and pasteurized milk is sold.

The Public Health Service Milk Ordinance, which forms the basis for the milk ratings, is now in effect through voluntary adoption in 397 counties and 1,542 municipalities. These represent increases of 10 and 7, respectively, in the past 6 months. The ordinance has been adopted as regulation by 34 States and 2 Territories. In 11 States and the 2 Territories it is in effect state-wide.

Although the ratings do not represent a complete measure of safety, they do indicate how closely a community's milk supply conforms to the standards for grade A milk as stated in the Public Health Service milk ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk in a community.

This compilation is from the Division of Sanitation of the Bureau of State Services, Public Health Service. The previous listing was published in Public Health Reports, March 1952, pp. 268–271. The rating method was described in Public Health Reports 53: 1386 (1938). Reprint No. 1970.

Although semiannual publication of the list is intended to encourage communities operating under the Public Health Service ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they were over 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion.

The rules for inclusion of a community on the "honor roll" are:

1. All ratings must be determined by the State milk sanitation authority in accordance with the Public Health Service rating method, which is based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service milk ordinance. (A recent departure from the method described consists of computing the pasteurized milk rating by weighting the pasteurization plant rating twice that of the raw milk intended for pasteurization.)

2. No community will be included in the list unless both its pasteurized milk and its raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the raw milk rating is 90 percent or more.

3. The rating used will be the latest submitted to the Public Health Service, but no rating will be used which is more than 2 years old. (In order to promote continuous rigid enforcement rather than occasional "clean-up campaigns," it is suggested that when the rating of a community on the list falls below 90 percent no resurvey be made for at least 6 months. This will result in the removal of the community from the subsequent semiannual list.)

4. No community will be included on the list whose milk supply is not under an established program of official routine inspection and laboratory control provided by itself, the county, a milk control district, or the State. (In the absence of such an official program there can be no assurance that only milk from sources rating 90 percent or more will be used continuously.)

5. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. (If the check rating is less than 90 percent, but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary interim shows a rating of 90 percent or more. If the check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for 2 years from the date of the check survey, unless a subsequent rating during this period warrants its removal.)

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1950–June 1952

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating
Alabama	
Auburn	9–19–1951
Montgomery	5–22–1952
Opelika	6–19–1952
Arkansas	
Fort Smith	10–19–1951
Colorado	
Colorado Springs	6– 6–1951
Cortez	7–––1950
Denver City and County.	11–27–1951
Durango	7–––1950
Grand Junction	4–25–1952
Pueblo	8–––1951
Weld County	4–11–1952
Georgia	
Albany	5–15–1952
Athens	4–10–1952
Atlanta	11–21–1951
Cairo	5–31–1951
Calhoun	2–15–1951
Columbus	3–30–1951
La Grange	6–25–1951
Quitman	5–30–1951
Valdosta	3–13–1952
Waycross	10–23–1951
West Point	6–22–1951
Illinois	
Chicago	8– 1–1951
Joliet	7–14–1950
Indiana	
Bedford-Orleans	10–––1951
Bluffton	1–––1952
Cooperative Grade A Milk Program: Boonville Holland Huntingburg Jasper	7–––1951
Evansville	10–––1951
Fort Wayne	11–––1951
Indianapolis	8–––1951
LaPorte	7–––1951
Madison	10–––1951
Marion and Gas City	4–––1951
Indianapolis	8–––1951
Rushville	8–––1951
South Bend	8–14–1951
Vincennes	5–––1951
Iowa	
Clinton	7–12–1950
Des Moines	7–––1951
Kansas	
Dodge City	4–11–1951
Erie	5– 1–1951
Hillsboro	2– 8–1951
Kansas City	12–11–1950
Kentucky	
Bowling Green and Warren County.	7–13–1950
Calloway County	2–15–1952
Campbell County-Newport.	11–28–1951
Kentucky—Continued	
Christian County	12–20–1951
Graves County	2– 7–1952
McCracken County	2–13–1952
Mount Sterling	8–16–1950
Owensboro	11–17–1950
Paris	5–17–1951
Louisiana	
New Orleans	12–6–1951
Vermilion Parish	9–9–1951
Mississippi	
Aberdeen	10–26–1951
Amory	10–25–1951
Belmont	7–12–1951
Booneville	9–28–1951
Columbus	8–13–1951
Corinth	6– 6–1951
Eupora	3–28–1952
Greenwood	4–15–1952
Grenada	1–22–1952
Houston	5–31–1951
Iuka	7–12–1951
Kosciusko	1–31–1952
Louisville	10– 4–1951
McComb	10–25–1951
New Albany	1– 7–1952
Okolona	5–29–1951
Starkville	11–27–1951
State College	11–27–1951
Tupelo	4–20–1951
Winona	1–24–1952
Missouri	
Cape Girardeau	10–25–1950
Chillicothe	10– 8–1950
Columbia	12–13–1950
Eldon	12–14–1950
Jackson	10–25–1950
St. Joseph	6–14–1951
Springfield	2–20–1952
Nevada	
Yerington	12–5–1951
North Carolina	
Burke County	6–28–1951
Charlotte	1–11–1952
Cumberland County	2–15–1952
Forsyth County	11–22–1950
Henderson County	2– 5–1952
High Point	2–16–1951
Jackson County	1–17–1952
Lincoln County	3–19–1952
Mars Hill	1– 4–1952
Mitchell County	8–10–1951
Randolph County	3– 9–1951
Richmond County	5–29–1951
Scotland County	5–31–1951
Swain County	1–17–1952
Transylvania County	2– 5–1952
Wilson	8– 2–1950
Yancey County	8–10–1951
Oklahoma	
Ardmore	7–28–1950
Duncan	10– 4–1950
Sulphur	8–29–1950
South Dakota	
Sioux Falls	10–12–1951
Tennessee	
Bristol	10–19–1951
Clinton	11–28–1951
Columbia	5–22–1952
Cookeville	11–14–1951
Covington	8–15–1950
Dandridge	9–17–1951
Dyersburg	8–17–1950
Erwin	10–15–1951
Fayetteville	6–27–1951
Franklin	6– 6–1952
Gallatin	5–11–1951
Greeneville	4–17–1952
Jefferson City	9–25–1951
Kingsport	10–23–1951
Knoxville	8–22–1951
Lawrenceburg	8–21–1950
Lebanon	7–19–1950
Lewisburg	6–12–1952
Loudon	4– 3–1952
Manchester	10– 5–1950
Memphis	6– 5–1951
Morristown	9–25–1951
Nashville and Davidson County.	11– 5–1951
Newbern	8–16–1950
Newport	9–18–1951
Paris	4–18–1951
Pulaski	5–24–1951
Rogersville	4–21–1952
Shelbyville	6–11–1952
Springfield	5– 8–1951
Sweetwater	10–19–1950
Texas	
College Station	9–20–1950
Corpus Christi	10–14–1950
Dallas	4–26–1951
Falfurrias	1–12–1951
Galveston	12–11–1951
Gladewater	1–19–1951
Harlingen	8– 4–1951
Kilgore	1–19–1951
La Feria	8– 2–1951
Lamesa	5–10–1951
Levelland	5– 9–1951
Lufkin	10– 8–1951
Mercedes	8–21–1951
Mission	8–24–1951
Orange	1– 6–1952
Pharr	8–22–1951
Port Arthur	10–17–1951
San Antonio	11–20–1951
San Benito	8– 1–1951
San Juan	8–23–1951
Texarkana	8– 5–1950
Texas City	1–16–1951
Tyler	10– 9–1951
Weslaco	8–24–1951
Wichita Falls	1–31–1951
Utah	
Delta	11–17–1950
Logan	5–14–1952
Minersville	1–25–1951

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1950–June 1952—Con.

Community	Date of rating
Utah—Continued	
Ogden	12–11–1951
Salt Lake City	4–29–1952
Virginia	
Abingdon	10–19–1951
Bristol	10–19–1951
Buena Vista	5– 8–1951
Front Royal	8–29–1951
Lexington	5– 8–1951
Luray	8–29–1951
Richmond	5–21–1952
Roanoke	9–23–1950
Staunton	11– 3–1950
Waynesboro	8– 3–1951
Washington	
Everett	6–14–1951
Spokane	9– 6–1951
Whitman County	6–19–1952
Wisconsin	
Madison	10– 5–1951

BOTH RAW AND PASTEURIZED MARKET MILK

Community and percent of milk pasteurized	Date of rating
Alabama	
Clanton, 87.2	5–12–1952
Huntsville, 98	8–10–1951
Lanett, 97.5	11– 9–1950
Georgia	
Camilla, 78	5–30–1951
Carrollton, 94.2	3–14–1952
Cartersville, 94.2	2–15–1951
Cedartown, 98.3	3–11–1952
Dalton-Whitfield County, 83.3.	4– 4–1951
Gainesville-Hall County, 93.1.	3–21–1952
Macon, 98.6	6–15–1951
Newnan, 94.7	6– 5–1952
Thomaston, 81.7	4–30–1952
Thomasville, 99.4	5–29–1951
Indiana	
Michigan City, 98.1	7—1951
Kansas	
Neodesha, 85	3–14–1951
Pittsburg, 98	1–17–1952
Kentucky	
Lexington and Fayette County, 97.	4–28–1952
Louisiana	
Iberia Parish, 96	5– 3–1951
Mississippi	
Gulfport, 98	4–30–1952
West Point, 97.6	7–18–1951
Missouri	
Boonville, 87	10–12–1950
Jefferson City, 88.5	7–20–1950
North Carolina	
Buncombe County, 95.8	6–15–1951
Cabarrus County, 80.3	1–15–1952
Caldwell County, 88.7	10–29–1951
Greensboro, 99.7	7–27–1950
Halifax County, 83.4	4–10–1952
Iredell County, 95.7	10–27–1950
Kings Mountain, 83.4	11–16–1951
Macon County, 91.4	8–10–1950
Montgomery County, 93.1	3–22–1951
Robeson County, 96.6	2–15–1952
Wilkes County, 90.6	9–20–1951
Oklahoma	
Elk City, 95.5	7–12–1950
Norman, 94.1	9–22–1950
Ponca City, 93.1	9–15–1950
South Carolina	
Spartanburg and Spartanburg County, 91.3	10–31–1951
Tennessee	
Cleveland, 94.4	9– 7–1950
Elizabethton, 94	8– 8–1950
Tennessee—Continued	
Harriman, 90.6	7–26–1951
Johnson City, 96.6	8– 9–1950
Maryville-Alcoa, 99.2	10–17–1950
McMinnville, 95.3	5– 7–1952
Murfreesboro, 98.7	7– 6–1951
Texas	
Amarillo, 95	7–23–1951
Austin, 97.3	10–24–1951
Beaumont, 99.4	10–20–1950
Brenham, 94.9	7–26–1951
Brownsville, 92.7	8– 1–1951
Bryan, 98.8	9–21–1950
Cleburne, 91.5	11–17–1950
Corsicana, 99.7	7– 9–1951
Edinburg, 93.8	8–28–1951
Kerrville, 98.2	5– 1–1951
Laredo, 62	8–24–1950
Longview, 99.4	1–19–1951
Lubbock, 99.2	11– 8–1950
Marshall, 88	7– 6–1951
McAllen, 99	8–22–1951
Palestine, 88.8	1–15–1952
Paris, 92.3	9–26–1951
Sherman, 93.3	11– 6–1951
Virginia	
Lynchburg, 98.2	6–22–1951
Washington	
Seattle-King County, 99.6	6—1951
West Virginia	
Kanawha County, 96	6– 6–1952

NOTE: In these communities the pasteurized market milk shows a 90-percent or more compliance with the grade A pasteurized milk requirements and the raw market milk shows a 90-percent or more compliance with the grade A raw milk requirements of the Public Health Service Milk Ordinance and Code.

Note particularly the percentage of milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized or boiled, either commercially or at home, before it is consumed.

Professional Examinations For Public Health Service Officers

By SIDNEY H. NEWMAN, Ph.D.

Professional examinations play a significant role in the professional lives of the individuals who take them. Traditionally, they have been of the essay or discussion type. Only recently has the objective type of examination been used in professional examinations. But more and more, objective professional examinations for a variety of purposes are being developed by Federal and State civil service systems, by professional specialty or diplomate boards, by professional licensing boards, and by professional or graduate schools (*1–7*). The Public Health Service is in the fore of this trend.

The problems of examining candidates for appointment as commissioned officers in the Public Health Service are relevant to all professional examinations. To be considered are the factors of fairness and accuracy, adequacy of construction, and measurement of professional competence and significant intellectual processes.

Officer Selection

Membership in the commissioned officer corps of the Public Health Service offers a lifetime career to the successful candidate. The Public Health Service offers two types of commissions: Regular and Reserve. Officer grades and salaries correspond to their equivalents in the Army and Navy.

Dr. Newman, a psychologist, is chief of the research branch, Division of Commissioned Officers of the Public Health Service.

The officer selection and evaluation program of the Public Health Service, initiated in the fall of 1947, is among the first to attack, in a broad and systematic manner, the problems of selection and evaluation of medical, scientific, and other professional health personnel. The development of efficient, objective methods for selecting the best qualified officers and for assuring equitable personnel actions within the commissioned corps is the goal of the program.

Professional examinations constitute only a part of the selection and evaluation procedures of the program. Background, personality, interest, and aptitudes are all recognized as factors important to the success of a Public Health Service officer. Selection methods also include interview board and file-evaluation board procedures as well as medical examinations (*8*).

Why Professional Examinations?

Professional examinations are designed to measure professional competence and knowledge. The individual undergoing examination is expected to demonstrate his ability to understand and to utilize the principles and knowledge of his profession. In solving examination problems, moreover, he will use the intellectual processes of reasoning, judgment, organization of ideas, integration of specific facts into generalizations, and application of facts and principles.

There is ample evidence that examinations are measuring individual differences among applicants for the commissioned officer corps. The evidence lies in the widely distributed scores

in the 150 or more different objective professional examinations which have been administered since 1947.

It is apparent that the possession of like professional degrees does not guarantee the exhibition of similar professional abilities, as measured by the tests. Professional competence is a clear-cut requisite for satisfactory performance in the commissioned officer corps. Therefore, it is important to identify all candidates who stand relatively low on the scoring.

Objective Examinations

The objective type of test is most commonly utilized because of its generally accepted advantages over the discussion or essay kind:

More accurate and more equitable comparisons among candidates are possible because the rapid machine-scoring of the tests is uniform, and bias is eliminated.

By yielding more reliable and more stable results, the test scores are better suited to statistical treatment, making it possible to develop test standards and to compare groups of candidates.

The candidate is required to deal with the subject of the question, thereby revealing his strength or weakness.

It is possible to examine a candidate's professional competence and knowledge more quickly, more intensively, and more extensively.

The five-alternative multiple-choice form is the kind of objective question now used. The question states a problem or situation and presents five answers or solutions, only one of which is considered to be correct. The question is not limited to verbal material—it may contain diagrams, pictures, graphs, symbols, or numbers.

Although it is planned to explore the possibilities of other objective test forms, three main considerations led to the current use of the multiple-choice question. First of all, it lends itself to reliable, uniform, and stable scoring. It can be carefully constructed to measure complex intellectual processes. Also, it has been found easier to demonstrate to subject-matter experts the construction of complex multiple-choice items than the construction of various other forms of items.

Questions which assess rote memory and straight knowledge are used as little as possible.

From four to six 3-hour objective examinations in each professional category are used in selecting officer candidates for the Regular Corps. Objective examinations are also used, partly, for promotions within the Regular Corps to the grades of assistant and senior assistant, which are the equivalents in the Navy, for example, of lieutenant, j. g., and lieutenant. A brief but comprehensive 3-hour test is administered to Reserve Corps applicants in designated categories. Each examination usually contains from 100 to 150 items.

Practical and Essay-Type Examinations

Two other types of professional examinations are used in the selection and evaluation program. These are the 10-hour practical work examination for dental officer candidates and a specially devised essay examination for scientist officer candidates.

In the practical dental examination, the candidate places an amalgam restoration in a patient's mouth and constructs a gold inlay in a green or ivorine tooth. The candidate is observed while performing the restoration at an examining center by two dental officers who independently rate his work on specially constructed observation-rating schedules. The gold inlays are sent to a central board of three dental officers in Washington who independently grade the cavity preparation and the finished inlays on special rating scales. The third part of the examination is completely objective: the candidate responds to multiple-choice questions by identifying oral pathological conditions which have been depicted on color slides.

Various studies of the observation and rating methods used in the practical dental examination are in progress. The administration and scoring of the practical examination have proved to be satisfactory. It is likely that practical work tests in some other professional categories would also be useful.

In the scientist officer examination, the discussion-type questions on scientific problems

and research are planned to measure characteristics of originality, judgment, and organization and expression of ideas. Even though this kind of question does have disadvantages, it is worth while to see if the essay question, when carefully constructed by scientist officers, could aid in the measurement of complex intellectual processes.

Rating scales similar to those generally used for evaluating individual performance have been developed for improving the grading of the essay question. Degrees of performance are defined for the graders, and score points are assigned to each question. Three scientist officers independently grade each paper.

The specially devised essay examination for scientist officers will afford an opportunity to study the reliability of this type of approach as well as the relationship between scores obtained by essay and objective methods.

Examination Construction

The Professional Examination Service staff of the American Public Health Association collaborates with the research branch personnel of the Division of Commissioned Officers of the Public Health Service in constructing objective examinations. In this cooperative endeavor, each organization performs the functions it is best equipped to do. The determination of examination policy, structure, and content is the responsibility of the research branch and other Public Health Service officers. The APHA Professional Examination Service staff aids and advises in the planning.

Procedural steps in constructing professional examinations are outlined:

1. Specialists in the professional fields prepare outlines covering the subject matter relevant to the training and experience requirements for each profession.

2. Experts in the subject profession prepare examination items on specified topics. They are given instructions for constructing multiple-choice questions and descriptions of the intellectual processes which the items should measure.

3. Test construction specialists check the items for format, grammar, and intelligibility.

4. A specialist in the subject field reviews the items for accuracy, content, and adherence to construction outline.

5. Experts in the appropriate professional field review logically grouped items.

6. Specialists revise the items in the light of criticisms from the expert reviewers.

7. Experts select the best of the reviewed items and arrange them in the examination according to subject matter and estimated difficulty.

After administration of each examination, continuous analyses of test scores and test items are used to improve and revise the examinations.

Test-construction procedures give reasonable assurance of the soundness, accuracy, and appropriateness of each item. Up to the present, approximately 1,900 experts in various professional fields have participated in the construction of tests. About 80 percent of these experts are not in the Public Health Service. A minimum of five experts reviews each test item.

Regular Corps Examinations

Professional examinations have been developed for selection of Regular Corps officers in each of the 10 major professional categories of the commissioned officer corps. Within professional categories, entrance and promotion examinations are given for the grades of junior assistant, assistant, and senior assistant. Professional examinations for different grades may bear the same title but may vary in content or in scoring standards.

The scope and variety of professional examinations which have been prepared for the Regular Corps since 1947 are seen in the list.

New examinations for physical therapist, sanitarian (medical social worker), sanitarian (psychiatric social worker), and scientist (physicist) are in preparation, to be given for the first time in 1952–53.

Effectiveness

Underlying the use of the professional examination is the theory that measurable differences in professional competence will be related to professional competence exhibited later in the Public Health Service. Testing this theory is

Regular Corps Examinations

DENTAL OFFICER

Oral: Bacteriology, pathology, medicine, and surgery.
General: Anatomy, pathology, and pharmacology.
Operative and prosthetic dentistry, and dental materials.
Periodontia, roentgenology, pedodontia, and dental public health.
Practical work-performance.

DIETETICS OFFICER

Junior Assistant and Assistant

Institutional management.
Meal planning and quantity cooking.
Bacteriology and physiology.
Chemistry of food, elementary food chemistry, and chemistry.
Normal nutrition and diet in disease.

Senior Assistant

Institutional management.
Meal planning and quantity cooking.
Bacteriology and chemistry of food.
Diet in disease, advanced.
Diet and advanced nutrition.
Educational psychology and teaching methods.

MEDICAL OFFICER

Medical sciences A: Anatomy, physiology, and biochemistry.
Medical sciences B: Pathology and microbiology.
Practice of medicine.
Practice of surgery.
Preventive medicine and public health.

NURSE OFFICER

Principles and practice of nursing—2 parts.

Hospital Nurse Option

Advanced nursing principles and policies—hospital nursing.
Supervision and teaching principles—hospital nursing.

Public Health Nurse Option

Principles and policies in public health nursing.
Supervision and teaching principles—public health nursing.

PHARMACIST OFFICER

Practice of pharmacy.
Physiology and pharmacology.
Pharmaceutical chemistries.
Pharmaceutical administration.
Bacteriology and public health.

SANITARIAN AND SCIENTIST OFFICERS

Bacteriologist

General bacteriology.
Applied bacteriology.
Infection and immunity.
Pathogenic bacteria.
Other pathogenic organisms.
Related sciences.

Chemist

Inorganic chemistry.
Analytical chemistry.
Physical chemistry.
Organic chemistry.
Biochemistry.
Basic sciences.

Entomologist

Entomology—2 parts.
Scientific method.
General parasitology.
Scientific professional problems and research.
Basic sciences.

Parasitologist

Parasitology—2 parts.
Scientific method.
General parasitology.
Scientific professional problems and research.
Basic sciences.

difficult, primarily because of the necessity for finding a reliable measure or criterion of professional competence as demonstrated on the job. A first approach to this problem has been made.

Criteria of Success

As a research project, Public Health Service officers at many installations rated each other on 20-point rating scales. These strictly confidential ratings of job proficiency, administrative ability, personality, and value to the Public Health Service were made with the understanding that the results would not be used in any type of personnel action. The ratings became the criteria for developing a new efficiency report and for validating methods of selecting officers. The new efficiency report should be a useful criterion of job performance.

However, such criteria as group ratings and efficiency reports are not actual, direct measures of work performance. Some aspects of job proficiency may be reflected in the group ratings, but other proficiency factors may be omitted.

For example, the practical work examination for dental officer candidates could more directly measure competence in clinical dentistry than could group ratings. This is not to disparage the importance of such ratings as useful criteria, particularly where colleagues might

Regular Corps Examinations

Protozoologist

Protozoology—2 parts.
Scientific method.
General parasitology.
Scientific professional problems and research.
Basic sciences.

SANITARIAN OFFICER

Health Educator

Methods and materials of health education.
Public health science and practices.
Principles and administration of health education.
Background information.

Mammalogist

General biology—2 parts.
Mammalogy—2 parts.

Milk and Food Specialist

Milk and food sanitation—2 parts.
General sanitation.
Public health background, methods, and procedures.

Nutritionist

Nutrition in health and disease.
General and food chemistry.
Group feeding.
General sanitation and hygiene.
Public health methods.

Ornithologist

General biology—2 parts.
Ornithology—2 parts.

SANITARY ENGINEER OFFICER

Junior Assistant

Mechanics, thermodynamics, and electricity.
Hydraulics, strength of materials, elementary engineering structures, and surveying.
Mathematics.
Physics and chemistry.
General background and public health methods.

Assistant and Senior Assistant

Water.
Air and industrial hygiene.
Sewage, stream pollution, and refuse.
Insect and rodent control.
Milk and food.
Public health administration.

SCIENTIST OFFICER

Aquatic Biologist

General biology—2 parts.
Aquatic biology—2 parts.

Biochemist

Biochemistry—2 parts.
Inorganic and analytical chemistry.
Organic and physical chemistry.
Basic sciences.

Physiologist

Muscular, neutral, and sensory systems.
Respiratory and circulatory systems.
Nutritive and excretory processes.
Endocrinology, general physiology, and scientific method.
Research.
Basic sciences.

Psychologist

Clinical psychology—2 parts.
Developmental and social psychology.
Evaluation, measurement, and psychological statistics.
Theoretical, experimental, and physiological psychology.
Related sciences.

VETERINARY MEDICAL OFFICER

Bacteriology, pathology, and parasitology.
Infectious diseases and epidemiology.
Medicine and surgery.
Public health.
Anatomy, physiology, and biochemistry.
Therapeutics, materia medica, and public health.

readily observe factors of job competence during daily contacts.

It is hoped that future research will develop reliable and direct measures of actual work performance in the various professional categories. They could serve as validation criteria for professional examinations, group ratings, and efficiency reports.

Intellectual Measurements

Corollary to the theory that professional examinations do measure professional competence is the hypothesis that they also are measuring such complex intellectual processes as interpreting, judging, reasoning, and integrating. To test the hypothesis, it is appropriate to ask, "What intellectual processes are most closely related to successful performance in the Public Health Service?"

Since multiple-choice items are constructed to measure complex intellectual processes, and are accepted by testing experts as doing so, they furnish a good starting point in seeking answers to the above question. Suitable analytical studies of the relationships between the items might reveal interrelated groups of items, and might yield hypotheses or data on the factors measured by each group. The relationship of each group to criteria of performance in the Public Health Service could then be studied. Those item groups yielding scores most closely related to performance could serve as models for similar items or questions. In addition,

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forms of objective test items other than multiple-choice questions could be similarly investigated.

More Research Needed

Because there is surprisingly little published research about professional examinations, the experience of the officer selection and evaluation program and of the APHA Professional Examination Service will benefit organizations that use, or plan to use, professional examinations. It is evident that careful planning and research are needed to develop professional tests which are adequate, suitable, and appropriate to the measurement that is required and which actually measure professional competence and knowledge with the utmost scientific objectivity.

ACKNOWLEDGMENTS

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Shaw Heads Division of Hospitals

The appointment of Dr. James R. Shaw as chief of the Division of Hospitals, Bureau of Medical Services, Public Health Service, was announced in July.

Formerly medical officer in charge of the Public Health Service Hospital, Detroit, Mich., Dr. Shaw succeeds Dr. G. Halsey Hunt, who was recently named associate chief, Bureau of Medical Services.

In 1936, after receiving his medical degree at the University of Michigan Medical School, Dr. Shaw joined the Public Health Service as medical intern, assigned to its hospital at New Orleans, La. In addition to a fellowship in internal medicine at the Mayo Clinic, Dr. Shaw took postgraduate work in hospital administration at Stanford University, San Francisco, and the University of California. Before coming to the Public Health Service Hospital in Detroit, Dr. Shaw's Public Health Service career included assignment in the internal medicine departments of several of its hospitals and out-patient clinics, a tour of duty as district Coast Guard medical officer, Long Beach, Calif., and medical officer in charge of the Public Health Service clinics at Los Angeles and San Pedro, Calif.

VDRL, Kahn, and Kolmer Tests for Syphilis

By SIDNEY OLANSKY, M.D., AD HARRIS, FRED G. HARB, M.D., HILFRED N. BOSSAK, B.S., and ROXIE NEVIL, B.S.

The diagnosis of central nervous system (CNS) syphilis is frequently dependent on laboratory findings. The spinal fluid tests most widely employed include white cell counts, total protein determinations, colloidal precipitation techniques, and complement fixation or flocculation tests for syphilis.

Several studies comparing the VDRL and Kolmer spinal fluid tests have been reported (*1–3*), but the laboratory findings were not correlated or compared with physical findings or diagnoses.

In a 6-month cooperative study by the Venereal Disease Research Laboratory of the Division of Venereal Disease, Public Health Service, and the Alto Medical Center of the Georgia State Department of Health, on 5,539 patients admitted to the treatment center, the VDRL, Kahn, and Kolmer tests on the spinal fluid of each patient were evaluated in their relation to other laboratory findings and diagnoses.

Methods

Duplicate tubes of spinal fluid were collected from patients admitted to the treatment center at Alto. A white cell count, total protein determination (biuret method), and Kahn test were performed on one tube of this fluid in the laboratory at the treatment center. The second tube of spinal fluid was sent to the Venereal Disease Research Laboratory at Chamblee, Ga., by auto (approximately 60 miles and 2 hours away), where the VDRL and Kolmer tests for syphilis and another total protein determination (*4*) were performed.

For analyses, the results of the VDRL, Kahn, and Kolmer tests are divided into reactive (positive and doubtful) and nonreactive (negative) groupings. The broad relationship of the results of these three tests in this study is shown in table 1.

Disagreement existed between results obtained with VDRL, Kahn, and Kolmer tests on 132 spinal fluids. Agreement-disagreement ratios for these tests for syphilis, on this group of specimens, and correlation of these results with other laboratory findings and diagnoses are recorded in table 2. White cell counts of five or more and total protein of 41 mg. per 100 cc. or greater were considered as abnormal findings for the categories in table 2.

When they were admitted to the treatment center, all patients in this study had evidence of syphilis infection, including a positive or doubtful blood test. Since the doctors at the treatment center received only the results of the Kahn and other tests performed in the laboratory at that facility, positive reactions in the VDRL and Kolmer tests were not used as bases for diagnoses of asymptomatic neurosyphilis. However, positive Kahn tests on spinal fluids were frequently the prime, and sometimes the only, determinants of decisions regarding asymptomatic neuroinvasion phases of syphilitic infection.

Dr. Olansky is director of the Venereal Disease Research Laboratory, Venereal Disease Division, Public Health Service, Chamblee, Ga.; Mr. Harris, assistant director, is chief of the serology section, and Mr. Bossak is assistant chief. Dr. Harb and Miss Nevil are medical officer in charge and laboratory director, respectively, of the Alto Medical Center, Alto, Ga.

Patients in categories C and D, "No neurosyphilis diagnosis" (table 2), are those who have had no such diagnoses on previous admissions, or during the present admission to the Alto rapid treatment center. However, discharge diagnoses from present admissions may in some instances be altered in this regard if attending physicians consider that cell count and total protein spinal fluid findings indicate neuroinvasion.

Analysis of Test Results

The figures recorded in table 1 show little percentagewise differences between the three listed tests. However, 12 more positive reactions were reported for the VDRL test than for either the Kahn or Kolmer method. Since admissions to the treatment center at Alto are principally predicated on positive blood tests for syphilis without reference to current spinal fluid findings, and, since spinal fluids used in this study were collected from unselected routine admissions over a period of 6 months, the reactivity rates recorded in table 1 probably represent average expectancy in the selected population group served by this center. Of the 5,539 spinal fluids tested in this study, 9.1 percent (an average of 1 to each 11 admissions to the treatment center) reacted in one or more of the three spinal fluid tests for syphilis.

Results of the Kahn and Kolmer tests (table 1) appear to be in closer agreement than are those of the VDRL test with either of the other two tests. However, reference to the test agreement-disagreement listings in table 2 shows that there is greater agreement between the VDRL and Kolmer tests than between any two of the other tests. In the 132 instances where the three tests failed to agree, the VDRL-Kolmer combination was reactive 38 times and nonreactive 52 times—a total agreement of 90 times. In this group of discrepancies, the Kahn-Kolmer combination showed agreement in 30 instances and the VDRL-Kahn combinations agreed only 12 times.

All other findings in tests for syphilis on the 5,539 spinal fluids used in this study were in agreement, that is, all three tests were nonreactive (5,036) or all three tests were reactive (371). The VDRL and Kolmer tests were in agreement on 5,497 of 5,539 spinal fluids tested (99.2 percent), the Kolmer and Kahn test combination agreed 5,437 times (98.2 percent), and the VDRL and Kahn test results agreed in 5,419 spinal fluids (97.8 percent), tested in this study.

Table 1. Results obtained with VDRL, Kahn, and Kolmer tests of spinal fluids of 5,539 patients

Tests	Number of spinal fluids			
	Reactive (positive and doubtful)		Nonreactive (negative)	
	Number	Percent	Number	Percent
VDRL	437	7.9	5,102	92.1
Kahn	425	7.7	5,114	92.3
Kolmer	423	7.6	5,116	92.4
1 or more tests	503	9.1		
All 3 tests	371	6.7	5,036	90.9

In categories A and B, made up of patients with a diagnosis of neurosyphilis, as in categories C and D, which were made up of patients in whom this diagnosis was lacking, approximately equal numbers of positive reactions (table 2) were obtained by using the VDRL test alone, the Kolmer test alone, and both the VDRL and the Kolmer test. A large proportion (44 of 52) of the reactions (+) in the Kahn test alone were in the group of patients having neurosyphilis diagnoses. However, these two types of findings were definitely influenced by the fact that many original diagnoses of neurosyphilis were predicated on Kahn spinal fluid test findings alone, since results of the other two tests for syphilis were not available to the attending physicians at the time that the original diagnoses were made. It was also interesting to note (table 2) that in only two instances were reactions in both the Kahn and Kolmer tests accompanied by negative findings in the VDRL test. Although reactions with either the VDRL or Kahn test were associated with negative Kolmer test findings, a negative Kolmer test was found in no instance where both the VDRL and Kahn tests reacted (+).

In patient category A (table 2) 18, 15, and 13 positive or doubtful reactions (+) were ob-

tained with the Kahn, VDRL, and Kolmer tests, respectively. In the B category of this table, 28 Kahn, 18 VDRL, and 14 Kolmer test reactions (+) were reported. Since 19 of the 48 diagnoses in the B category were made on Kahn test findings alone, these figures, and, conversely, those in the C and D categories were weighted in favor of the Kahn test by this factor.

The C category of table 2 shows 13 VDRL, 9 Kolmer, and only 3 Kahn test reactions (+), while the D category contains 20 VDRL, 16 Kolmer, and only 5 Kahn test reactions (+). The significance of the diagnosis on the basis of the Kahn test alone in categories B, C, and D in influencing these findings is stated in the preceding paragraph.

A comparison of the results of the VDRL, Kahn, and Kolmer test findings with abnormalities in the cell count and total protein reports may be visualized by combining findings recorded in categories A and C (table 2). The 53 spinal fluids in these two categories had higher than normal findings in either or both protein content and cell count. In these 53 spinal fluids, positive (+) findings were obtained in 28, 22, and 21 instances by the VDRL, Kolmer, and Kahn tests, respectively. Thus, a slightly greater correlation was obtained between positive findings with the VDRL test and cell count plus total protein results than was produced by either of the other two tests for syphilis.

The test in use in the laboratory providing the data on which the original diagnosis is based is in a favored position. Since asymptomatic neurosyphilis is a laboratory diagnosis, the result of the test for syphilis often establishes the diagnosis. For example, in the B category, (column 2, table 2), 19 patients were diagnosed asymptomatic CNS syphilis on the basis of a positive Kahn test alone. Had the VDRL or the Kolmer spinal fluid test been used instead, there would have been no diagnosis of CNS syphilis in these instances. In other words, since the diagnosis is based on laboratory findings, the particular test employed in the institution will check 100 percent with the diagnoses. In the category of asymptomatic CNS syphilis, it is impossible to determine the specificity of the spinal fluid tests for syphilis, since the clinical findings are normal. One may be partially guided by the cell count and total protein, but abnormalities in these, although frequently more significant, may be even less specific than the spinal fluid tests for syphilis.

Our findings can point out no marked superiority of any of the test procedures studied. However, since the diagnosis of CNS syphilis may be determined by spinal fluid tests for syphilis, which may disagree, more information is available to the diagnostician if two or more

Table 2. Relationship of 132 discrepant reactions obtained with the VDRL, Kahn, and Kolmer tests on spinal fluids to clinical status of patients

Categories [1]	VDRL+ Kahn− Kolmer−	VDRL− Kahn+ Kolmer−	VDRL− Kahn− Kolmer+	VDRL+ Kahn+ Kolmer−	VDRL+ Kahn− Kolmer+	VDRL− Kahn+ Kolmer+	Total
A. Neurosyphilis (past or present), cell count [2] and/or total protein [3] abnormal.	5	18	3	0	10	0	36
B. Neurosyphilis (past or present), cell count and total protein normal.	8	[4] 26	2	0	10	2	48
C. No neurosyphilis, cell count [2] and/or total protein [3] abnormal.	5	3	1	0	8	0	17
D. No neurosyphilis, cell count and total protein normal.	10	5	6	0	10	0	31
Total	28	52	12	0	38	2	132

[1] By diagnosis and present cell count and/or total protein.

[2] Abnormal cell count=more than 5 per mm.

[3] Abnormal total protein=more than 40 mg. per cubic centimeter.

[4] Includes 19 diagnosed as having asymptomatic CNS syphilis with the Kahn test the only positive spinal fluid finding.

+Positive or doubtful.

−Negative.

such tests are performed on each spinal fluid. The VDRL-Kolmer combination was in closer agreement than other test combinations discussed in this report.

Summary

1. Results obtained with the VDRL, Kahn, and Kolmer tests for syphilis, plus the status of cell counts and total protein determinations, on 5,539 spinal fluids drawn from patients in the treatment center at Alto, Ga., are presented and discussed.

2. For each 11 admissions to the Alto treatment center, an average of one spinal fluid (9.1 percent) gave positive or doubtful reactions in one or more of the three tests for syphilis used in this study during a 6-month period.

3. Results obtained with the VDRL and Kolmer tests were in closer agreement than were those of the VDRL-Kahn or Kahn-Kolmer test combinations.

4. In 132 spinal fluids, where the results of the VDRL, Kahn, and Kolmer tests were not in agreement, slightly better correlation was obtained between the reactive VDRL tests and increased cell counts and/or total protein findings than existed between these two findings and the reactivity of the Kahn or Kolmer tests.

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Industrial Sickness *Absenteeism*

Last Two Quarters, 1951

Prepared by W. M. Gafafer, D.Sc., head of statistical services for the Division of Occupational Health, Bureau of State Services, Public Health Service. The report for the first two quarters of 1951 appeared in the May 1952 issue.

An upward trend in industrial sickness absenteeism is indicated by the frequency rates for the last two quarters of 1951 and the year 1951.

The over-all rates for the third and fourth quarters of 1951 (109.5 and 125.2 absences per 1,000 males) represent 11 and 6 percent increases over the 1950 rates for the same periods (98.6 and 118.0, respectively).

The 1951 third quarter rates for respiratory diseases, digestive diseases, and nonrespiratory-nondigestive diseases are 16, 14, and 5 percent above the corresponding rates for 1950, while the 1951 fourth quarter rates for the same disease groups are 8, 6, and 7 percent, respectively, above the 1950 rates.

The specific cause rates for 1951 are generally higher than the corresponding ones for 1950. Notable are the increases of 45 percent for influenza and grippe, and 23 percent for infectious and parasitic diseases.

A review of the broad-cause group rates for the third and fourth quarters for the past 10 years, 1942–51, shows for 1951 all but the respiratory group to be above the corresponding 10-year average. The 1951 third and fourth quarter rates for this cause group are 10 and 25 percent below the 10-year average of the respective quarters.

The data shown in the accompanying table on 8-day or longer disabilities experienced by approximately 170,000 male employees were derived from periodic reports submitted by industrial sick benefit associations, company relief departments, and group health insurance plans.

Absences per 1,000 male employees by cause (annual basis)—sickness and nonindustrial injuries disabling for 8 consecutive days or longer—third and fourth quarters, 1951 [1]

Cause [2]	Number of absences per 1,000 males beginning in specified period						
	Fourth quarter		Third quarter		Year		
	1951	1950	1951	1950	1951	1950	1946–50
Sickness and nonindustrial injuries	**125.2**	**118.0**	**109.5**	**98.6**	**131.2**	**117.8**	**107.0**
Nonindustrial injuries (169–195)	**16.2**	**15.3**	**17.3**	**13.9**	**16.0**	**14.0**	**12.2**
Sickness	**109.0**	**102.7**	**92.2**	**84.7**	**115.2**	**103.8**	**94.8**
Respiratory diseases	**34.0**	**31.5**	**21.9**	**18.9**	**41.6**	**34.6**	**33.6**
Tuberculosis of respiratory system (13)	.4	.4	.6	.7	.6	.5	.6
Influenza, grippe (33)	8.8	8.6	5.1	4.0	16.1	11.1	11.7
Bronchitis, acute and chronic (106)	6.6	6.1	3.7	3.3	6.2	6.0	5.5
Pneumonia, all forms (107–109)	4.7	5.0	3.2	3.4	5.8	5.4	4.2
Diseases of pharynx and tonsils (115b, 115c)	3.6	3.2	2.8	2.5	3.6	3.2	3.7
Other respiratory diseases (104, 105, 110–114)	9.9	8.2	6.5	5.0	9.3	8.4	7.9
Digestive diseases	**22.2**	**21.0**	**22.5**	**19.8**	**22.2**	**20.1**	**17.2**
Diseases of stomach except cancer (117, 118)	7.6	6.8	6.5	6.3	7.0	6.2	5.4
Diarrhea and enteritis (120)	2.9	2.5	3.4	2.4	2.9	2.6	2.2
Appendicitis (121)	3.9	4.5	4.8	4.7	4.5	4.2	3.6
Hernia (122a)	3.6	3.0	3.2	2.7	3.3	3.0	2.6
Other digestive (115a, 115d, 116, 122b–129)	4.2	4.2	4.6	3.7	4.5	4.1	3.4
Nonrespiratory-nondigestive diseases	**49.6**	**46.2**	**44.5**	**42.5**	**48.1**	**45.3**	**40.7**
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [3]	3.2	2.8	2.9	2.2	3.7	3.0	2.7
Rheumatism, acute and chronic (58, 59)	3.7	3.5	3.1	3.3	3.6	3.6	4.0
Neurasthenia and the like (part of 84d)	1.6	1.7	1.9	1.4	1.7	1.6	1.7
Neuralgia, neuritis, sciatica (87b)	2.4	2.3	1.8	2.0	2.2	2.1	2.4
Other diseases of nervous system (80–85, 87, except part of 84d, and 87b)	1.9	2.4	2.2	2.3	2.1	2.3	1.8
Diseases of heart and arteries, and nephritis (90–99, 102, 130–132)	8.3	8.3	6.1	7.3	7.9	8.3	7.1
Other genitourinary diseases (133–138)	5.2	4.0	4.4	4.3	4.8	4.2	3.3
Diseases of skin (151–153)	3.5	4.1	4.4	4.1	3.7	3.6	3.4
Diseases of organs of movement except diseases of joints (156b)	3.9	3.2	3.4	2.9	3.5	3.1	2.9
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	15.9	13.9	14.3	12.7	14.9	13.5	11.4
Ill-defined and unknown causes (200)	**3.2**	**4.0**	**3.3**	**3.5**	**3.3**	**3.8**	**3.3**
Average number of males	172,855	166,101	174,123	166,710	170,922	161,525	948,340

[1] Industrial injuries and venereal diseases are not included.

[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.

[3] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

PHS publications

Directory of State and Territorial Health Authorities, 1952

Revised as of May 1, 1952, the directory lists all State and Territorial health authorities and the officials of the State agencies participating in grant programs administered by the Public Health Service. Health officials of each State are presented on the basis of the State's organizational pattern for carrying out the health activities incorporated in the comprehensive health program. The State agencies, other than health departments, listed are: mental health agencies, hospital planning and construction agencies, and water pollution control agencies. Public Health Service personnel in charge of functions closely associated with State health departments are also listed.

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Directory of State and Territorial Health Authorities—1952. (Public Health Service Publication No. 75) 1952 revision. 61 pages. 20 cents.

for the general public

Snake Bite

The first part of this leaflet is devoted to information on the habits of snakes, where they rest, and when and how they attack. The reader is given advice on ways of protecting himself from possible snake bite. This is followed by detailed instructions for first aid treatment with emphasis on keeping the victim quiet. Getting the patient to a physician or hospital for antivenin as quickly as possible is stressed. The reader is also instructed on how to administer first aid if alone when bitten.

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Snake Bite. Health Information Series, No. 10 (Public Health Service Publication No. 188). Revised 1952. 2-fold leaflet. 5 cents; $1.25 per 100.

Heart Disease

Because of advances in knowledge of heart disease and an increased demand for information on the Nation's leading cause of death and disability, the National Heart Institute and the Division of Chronic Disease and Tuberculosis, Public Health Service, have brought up to date and expanded three earlier leaflets to form a new series of four.

Heart Disease. The first in the series contains general information on the physiology of the heart, the current status of knowledge on heart disease and a brief discussion of the three common types, rheumatic heart disease, coronary artery disease, and hypertension, in terms of cause, manner in which they affect the heart, and the age groups involved. The reader is advised that symptoms of heart disease may or may not be apparent and the warning signs may indicate that something else is wrong. A physical check-up once a year is suggested and emphasis is placed on cooperation of the patient with his physician in the treatment of heart disease.

Rheumatic Heart Disease. This leaflet contains a discussion of the cause of rheumatic heart disease, rheumatic fever, the streptococcal infection that usually precedes it, and the ways in which the heart itself may be damaged by the infection. The difficulty of diagnosis is pointed out, with a description of the various tests the physician will use in detecting the disease. The importance of the role of the parents in caring for a child during prolonged bed rest is stressed. Means of preventing recurrent attacks of streptococcal infection are suggested and the need for community health facilities is discussed.

Coronary Artery Disease. Presented as the story of Roger Franklin's heart attack, this leaflet gives information on the coronary arteries, how they function, and how coronary artery disease affects them. The manner in which nature develops collateral circulation following coronary thrombosis is described, emphasizing the necessity for maintaining a balance between rest and activity, and the necessity for cooperation between the patient and his physician during treatment.

Hypertension. The fourth leaflet in the series begins with a description of the mechanics of high blood pressure, or hypertension — the tightening up of the arterioles, and the loss of the elasticity of the blood vessels. While it is explained that the reason for these changes is unknown, some probable causes are suggested. Variations in normal blood pressure and low blood pressure are discussed as in the first three leaflets, and following the doctor's advice in the course of treatment is stressed. A list of commonsense rules for the hypertensive patient are given at the end, the most general one being moderation in everything.

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Heart disease. Health Information Series No. 63 (Public Health Service Publication No. 45). January 1952. 2-fold leaflet. 5 cents; $1.25 per 100.

Rheumatic Heart Disease. Health Information Series No. 67 (Public Health Service Publication No. 144). January 1952. 2-fold leaflet. 5 cents; $1.25 per 100.

Coronary Artery Disease. Health Information Series No. 68 (Public Health Service Publication No. 145). January 1952. 2-fold leaflet. 5 cents; $1.25 per 100.

Hypertension. Health Information Series No. 69 (Public Health Service Publication No. 146). January 1952. 2-fold leaflet. 5 cents; $1.25 per 100.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.